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November 15, 2018

Ricardito Vargas  
United States Environmental Protection Agency  
Region 2  
290 Broadway  
New York, New York 10007-1866

**Subject:** Response to August 31, 2018 EPA/NJDEP Letter Regarding Former Chevron  
Perth Amboy Facility Water Body Sediment Sampling  
**Facility EPA ID#: NJD081982902**

Dear Mr. Vargas:

Thank you and the State representatives for meeting with Chevron and our consultants to resolve the remaining HSWA Permit issues relating to the three surface water bodies adjacent to the former Chevron Perth Amboy Facility (Arthur Kill, Spa Spring Creek and Woodbridge Creek). We believe the meeting and site tour were useful in identifying and resolving outstanding issues and provided a roadmap for finalizing the investigation in accordance with the HSWA Permit conditions. Chevron's investigations conducted to date have provided a significant understanding of sediment quality in the areas of the waterways proximate to the Facility. The Facility's 2013 Hazardous and Solid Waste Amendments Permit Renewal and Permit Modification I requires that the RCRA Facility Investigation (RFI) be completed for the three water bodies (HSWA Permit Module III, Page 25 and 26). During our September 17, 2018 meeting we agreed upon an approach to fill in existing data gaps through the completion of a supplemental sediment sampling effort; the proposed field sampling workplan for this effort is provided as an attachment to this letter (Attachment 1), the Supplemental Field Sampling and Analysis Plan (SFSAP)) and discussed in more detail below. Chevron is committed to performing the final investigatory tasks identified in this letter and the SFSAP to complete the HSWA Permit investigation for the water bodies as soon as possible.

As requested, Chevron is also providing the following response to the August 31, 2018 letter from the Environmental Protection Agency (EPA) (Attachment 2), which contained recommendations and comments from the New Jersey Department of Environmental Protection (NJDEP) concerning the three surface water bodies. The response to this letter and the SFSAP incorporate the comments, agreements and information discussed in the September 17, 2018 meeting between Chevron, EPA and NJDEP, and supersedes the NJDEP's March 24, 2017 letter.

The EPA August 31, 2018 comment letter is separated into two parts. The first part of the letter contains the EPA cover letter and the second part of the letter contains NJDEP recommendations and comments as an attachment. The NJDEP recommendations/comments are separated into General Comments and Specific Comments. The Specific Comments address each of the water bodies; Woodbridge Creek, Spa Spring Creek and the Arthur Kill. The following is the full text of the August 31, 2018 EPA Cover Letter and NJDEP comments, presented in sections that are followed by Chevron's response to comments (RTC).

### **EPA Cover Letter**

Cover Letter Paragraph 1 - The U.S. Environmental Protection Agency (EPA) Region 2 and the New Jersey Department of Environmental Protection (NJDEP) have drafted comments regarding Chevron's upcoming waterbody sediment sampling. Chevron previously sampled Woodbridge Creek, Spa Spring Creek, and the Arthur Kill for VOCs, SVOCs, EPH, PCB, Metals, and Pesticides in 2002 and 2014. However, based on a review of data collected from the 2 sampling periods, EPA and NJDEP have determined that the three waterbodies sediment, associated with the Former Chevron Perth Amboy Refinery, must be further investigated (i.e., additional sampling must be performed) pursuant to N.J.A.C. 7:26E-2.1 (a)14; 2.1 (d); 3.6, 4.8, 4.9, 5.1 (e), et al., and NJDEP's Ecological Evaluation Technical Guidance (EETG), February 2015. The goal of the additional investigation is to complete a comprehensive RCRA Facility Investigation (RFI) of these waterbodies and thus fulfill the requirements set forth by the 2013 EPA HSWA Permit renewal.

*Chevron Response to Cover Letter Paragraph 1 – Chevron will complete the RCRA Facility Investigation (RFI) for the water bodies as specified in the 2013 Hazardous and Solid Waste Amendments (HSWA) permit renewal and Permit Modifications I (Module III, Page 25 and 26). Once agreed upon, this response to comment letter and the attached sediment sampling workplan and support documentation will fulfill the requirement of the 2013 (HSWA) Permit. Please note that the reference to N.J.A.C. 7:26E-5.1(e) appears to be incorrect as it is not part of the investigative regulatory requirements.*

Cover Letter Paragraph 2 - Additional sampling is needed to complete delineation of product and other contaminants along all the waterbodies. Enclosed are EPA and NJDEP comments for the upcoming sediment sampling. To meet these sampling objectives, a Field Sampling and Analysis Plan (FSAP) must be designed to characterize and delineate site-related free and residual petroleum product and other site-related contaminants, such that the lateral and vertical extent of contamination are well defined to determine the approximate volume of contamination in these water bodies.

*Chevron Response to Paragraph 2 – A Sediment SFSAP is included with this letter as Attachment 1. The Sediment SFSAP incorporates the comments and information discussed, and the agreements reached, in the September 17, 2018 meeting. The objective of the SFSAP is for this to be the last round of sampling and analysis to fulfill the requirements of the 2013 HSWA Permit. As previously*

*discussed in prior RFI reports and at the September 17, 2018 meeting, these water bodies are located in a historically industrialized/urban area with many other adjacent industrial facilities present in the vicinity in addition to Chevron.*

### **NJDEP General Comments**

General Comment 1 - Historic aerial photographs and existing sediment data suggest there are elevated levels of petroleum product and contaminants at historic outfall/discharge areas located near transect 3 (oil/water separator, SMU 40) and transect 2 (former tidal creek) in Woodbridge Creek. Chevron should identify all other historic contaminant migration pathways into Woodbridge Creek, Spa Spring Creek, and the Arthur Kill, including direct or indirect discharge of untreated or treated industrial process waste. The specific contaminants, mass estimates, and timeframe/duration of the discharge should be provided.

*Chevron Response to General Comment 1 – During the September 17, 2018 meeting, Chevron noted that known current and historic site conditions including the location of former facility waste water/stormwater outfalls, and the location of proximate waste management units were used as basis for identifying sediment sample locations in Chevron's prior two sediment sampling investigations of the waterbodies. Chevron identified and provided known information on these current and former outfalls and waste management units in the Description of Current Conditions (DOCC), which was originally submitted to the EPA/NJDEP in 1994 pursuant to the original HSWA Permit. The DOCC further identified Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) at the Facility and their known or suspected discharge mechanisms to the water bodies. The information obtained from the DOCC, a review of historic aerial photographs and subsequent information obtained from completion of the RCRA Facility Investigation for these SWMUs and AOCs formed the basis of selecting sediment samples.*

*Available information on the history of the New Jersey Pollutant Discharge Elimination System Discharge to Surface Water Permits (NJPDES-DSW) permits for the former Chevron Perth Amboy Refinery is summarized in the DOCC (pages 2-31 through 2-34; and is included as Attachment 3). The former Chevron Perth Amboy Refinery held NJPDES-DSW permit No. NJ000021 which permitted the discharge of treated waste waters and storm water to Woodbridge Creek through the Effluent Treatment Plant (DSN 005) and Spa Spring Creek (DSN 004). As provided in the DOCC, the initial NJPDES-DSW permit appears to have been issued in 1974 (then a federal NPDES permit).*

*Sediment samples from transect SED-05 on Woodbridge Creek was specifically placed at the ETPs outfall DNS 005. Sediment transect SED-04 is downstream of this outfall and is still adjacent to the ETP. Sediment transect SED-03 was placed further downstream of SED-04 to monitor potential discharges from SWMU 40 (the Old Pond), which likely served as an oil/water separator*

*prior to the construction of the current ETP.*

*Similarly, other sediment transects sampled during the 2002 and 2014 were purposely located adjacent to former and current waste water treatment/discharge areas as identified in the DOCC and subsequent documents. Sediment sample SED-11 was placed at DSN 004 in Spa Spring Creek to evaluate sediment quality at that location. As discussed in the September 17, 2018 meeting, the investigations of Woodbridge Creek, Spa Spring Creek, and the Arthur Kill included identification of known and potential contaminant sources from the site including all known direct and/or indirect discharges. The results and discussion from this data can be found in both Section 9 of the 2003 RFI report and the November 2016 Supplemental Baseline Ecological Evaluation. Chevron does not have detailed information regarding the specific contaminants, mass estimates and timeframe/durations of process waste discharges. An electronic copy of the DOCC was recently provided to the EPA by Chevron on September 24, 2018. A summary of the history of operations related to the adjacent waterbodies previously provided to the USEPA and NJDEP in the DOCC and subsequent RFI reports will be included in a final report along with the results obtained from implementation of the proposed SFSAP.*

General Comment 2 - Chevron submitted an updated data sheet to EPA on June 29, 2018. EPA and NJDEP are requesting that the facility no longer report data as "ND" or Non-Detect. Chevron needs to report the actual results, which can be followed by a "U" in parentheses to indicate that the results are less than the Method Detection Limit (MDL). EPA and NJDEP request an updated data table to reflect this comment.

Chevron Response to General Comment 2 – As noted in the September 17, 2018, Chevron will provide data as requested in all future reports. Please note that in prior reports, data that was listed as ND were accompanied by a number in parentheses that indicated the MDL.

### **NJDEP Specific Comments - Woodbridge Creek**

Woodbridge Creek Comment 1 - Background Samples: EPA and NJDEP do not accept SED-09 as an appropriate background location. This transect contains EPH, among other contaminants, and thus cannot be considered as background. SED-10 does look like an area that can potentially be used as background. Chevron needs to re-sample this transect for all contaminants and product. EPA and NJDEP also believe that 3 sample points along the transect may not be sufficient to determine background concentrations. Thus, EPA and the NJDEP are requesting Chevron use USEPA's ProUCL method including the successive removal of statistical outliers, to determine background using a minimum of 8 samples.

Chevron Response to Woodbridge Creek Comment 1 – Chevron will collect eight (8) additional background samples along Woodbridge Creek, in the vicinity of SED-10, to comply with USEPA's ProUCL method. Locations are discussed in the attached response (See attached SFSAP). Please

*note that SED-09 transect represents potential upstream off-site source conditions.*

Woodbridge Creek Comment 2 - EPA is requiring an additional transect to sample for all contaminants (VOCs, SVOCs, EPH, PCB, Metals, Organochlorine Pesticides, TOC, and particle grain size) at the midpoint between SEO -09 and SED-06. The transect should contain 3 points (A-C), with C being closest to the facility, B the midpoint, and A located on the opposite side of the facility. If results show hotspots, Chevron must delineate by adding additional transects 200 feet from the hotspot in the upstream and downstream direction.

Chevron Response to Woodbridge Creek Comment 2 - *As shown on Figure 2 in Attachment 1 (SFSAP), Chevron will add two additional transects in between SED-06 and SED-09. Samples will be collected from the surface interval and from the subsurface interval exhibiting the greatest potential for contamination, determined by photoionization detector or visual observation. As discussed in the September 17, 2018, samples will be analyzed for extractable petroleum hydrocarbons (EPH), volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), priority pollutant Metals (PP Metals), total organic compounds (TOC) and particle grain size\ (but excluding Pesticides). As agreed upon during the September 17, 2018 meeting, Chevron does not need to further delineate hot spots to comply with the requirements of 2013 HSWA Permit.*

Woodbridge Creek Comment 3 - SED-06 – SED-03

- a. Resample transect for all parameters for all points and at consistent depths (surface and sub-surface)
- b. Add 2 additional points (A' and C') to extend the transect to the facility property and the Northfield property/Southern Parcels. These additional points need to be sampled for the full suite of parameters.

Chevron Response to Woodbridge Creek Comment 3

- a. *These transects were sampled in 2002 for a full suite of analytes. In 2014, selected sample locations and intervals were additionally analyzed for EPH. As agreed upon during the September 17, 2018 meeting, Chevron will resample all past locations for EPH analysis where EPH was not analyzed previously.*
- b. *As discussed, the September 17, 2018 meeting, sediments were characterized with COPECs above Ecological Screening Criteria from bank to bank using extrapolation, therefore, more defined delineation from sample locations A and C to the shoreline is not necessary.*

Woodbridge Creek Comment 4 - EPA is requiring an additional transect to sample for all contaminants (VOCs, SVOCs, EPH, PCB, Metals, Pesticides, Herbicides) at the midpoint between SED -03 and SED-02 and midway between SED-02 and SED-01. The transects should contain 3 points (A-C), with C being closest to the facility, B the midpoint, and A located on the opposite side of the facility. If results show hotspots, Chevron must delineate by adding additional transects 200 feet from the hotspot, both upstream and downstream

*Chevron Response to Woodbridge Creek Comment 4*

*Due to underground gas, product and fuel lines, and overhead bridges and railroad trestles, a vibrocore sample transect in between SED-03 and SED-02 is not feasible. During the 2012 sampling event, Williams Pipeline utility locator indicated that it was unsafe to use the vibracore rig in this area. It is possible that a shallow sediment could be collected from this transect using an Ekman Dredge sampler. The feasibility of this transect depends on the approval from the utility owners. At the meeting, Chevron indicated that a transect at a location between SED-01 and SED-02 (See SFSAP) is not on or adjacent to Chevron property. Regardless, Chevron will complete a transect here and analyze for the parameter list discussed above in Woodbridge Creek Comment 2. As agreed upon during the September 17, 2018 meeting, Chevron does not need to further delineate hot spots to comply with the requirements of 2013 HSWA Permit.*

Woodbridge Creek Comment 5 - SED-02: Resample transect for all parameters for all points and at consistent depths (surface and sub-surface).

*Chevron Response to Woodbridge Creek Comment 5* - *These transects were sampled in 2002 for a full suite of analytes (VOCs, SVOCs, PP metals and PCBs). In 2014, selected sample locations and intervals were additionally analyzed for EPH. As agreed upon during the September 17, 2018 meeting, Chevron agrees to resample all past locations for EPH analysis where EPH was not analyzed previously.*

Woodbridge Creek Comment 6 - SED-01: Resample transect for all parameters for all points and at consistent depths (surface and sub-surface).

*Chevron Response to Woodbridge Creek Comment 6* - *These transects were sampled in 2002 for a full suite of analytes (VOCs, SVOCs, PP metals and PCBs). In 2014, selected sample locations and intervals were additionally analyzed for EPH. As agreed upon during the September 17, 2018 meeting, Chevron agrees to resample all past locations for EPH analysis where EPH was not analyzed previously.*

*As specified in the 2016 Supplemental BEE, samples recollected from the subsurface interval were collected at depths with the greatest potential for environmental impact. Sediment depth, unlike a soil horizon, is transient and variable. Considering the 10-year gap between the sampling events, it was determined that returning to the same depth of the original sample would not provide the most representative data. For the SFSAP, Chevron will collect the deeper sediment samples from the depth intervals exhibiting the greatest potential for environmental impact based on field observations, following the prior methodology and as described above.*

Woodbridge Creek Comment 7 - SED -19:

- a. Add additional point (A) along transect and sample for full suite of parameters
- b. Resample transects for all parameters for all points and at consistent depths (surface and

subsurface)

Chevron Response to Woodbridge Creek Comment 7

- a. *As discussed during the September 17, 2018 meeting and in the 2016 Supplemental BEE, a sample was not feasible in this location. Riprap stone was installed along the shoreline, on the Motiva side of the creek, where the sample was to be collected. Vibracore sampling techniques do not allow for a sample to be advanced.*
- b. *As discussed at the September 17, 2018 meeting, EPH was analyzed in 2014 when this sample was collected. Therefore, additional sampling at this location is not necessary.*

Woodbridge Creek Comment 8 Other transects should be added as needed to investigate/delineate discharge areas identified as per General Comment 1 above.

Chevron Response to Woodbridge Creek Comment 8 – *As discussed in the September 17, 2018 meeting, Chevron has added an additional 4 transects (12 Sample locations, in addition to 8 natural background samples), to Woodbridge Creek.*

Woodbridge Creek Comment 9 - A transect is needed between the former Chevron Refinery Site and DITSWED-08. Please explain whether horizontal and vertical delineation is complete in the DITSWED-8 area.

Chevron Response to Woodbridge Creek Comment 9 - *An additional transect between Chevron and DITSWED-08 is not warranted. Former sediment sample locations SED-06 A, B and C on Transect SED-06 are in line with DITSWED-08, sediment sample DITSED-B08S, and the location of sample SED-06 A is adjacent to DITSWED-08.*

*Chevron does not own the property where DITSWED-08 is located and is not responsible for the requested work related to it. DITSWED-08 is located on Block 732.A, Lot 1, a 15.5 acre parcel of property owned by North Field Extension, LLC (“NFE, LLC”). NFE, LLC acquired Block 732.A, Lot 1 and a second parcel (the two parcels are collectively referred to as the “Northern Parcels”) in September 2013 from Chevron. The conveyance of the Northern Parcels to NFE, LLC was part of a litigation settlement.*

*Under the settlement, Chevron agreed with NFE, LLC and its principal parties, C.P. Chemicals, Inc., Phibro Animal Health Corporation and Legacy Vulcan Corp. (collectively, the “NFE Parties”), to convey the Northern Parcels to NFE, LLC only if EPA agreed (i) to remove the Northern Parcels from Chevron’s HSWA permit and its requirements and (ii) to obligate the NFE Parties to enter into an administrative order on consent with EPA to investigate and remediate the Northern Parcels. EPA was an integral part of the discussions that led to this arrangement and it was given all test data that existed at the time to review and understand the site conditions. As planned, in July 2013, EPA removed the Northern Parcels from the obligations of Chevron’s*

*HSWA permit, and in September 2013 it entered into an Administrative Order on Consent with the NFE Parties requiring them to investigate and remediate the Northern Parcels. Since a central component of this arrangement was to eliminate any Chevron obligation related to contamination at the Northern Parcels, Chevron is not required to perform investigation or remedial work related to DITSWED-08 under the HSWA Permit.*

*As part of the settlement, Chevron agreed to perform a very specific, limited scope of work—to excavate a small, isolated area of soil. Also, as part of the settlement, the NFE Parties agreed to perform “any required investigation or remediation of any and all contaminants in the Northern Parcels in accordance with the requirements of applicable law”. This obligation was “without regard to the source of the contamination”. Other than the limited excavation work noted above, the NFE Parties are responsible for any required investigation, delineation and remediation of contamination at the Northern Parcels, including any obligations related to the DITSWED-08 area. A copy of the Settlement Agreement is included as Attachment 4 for your reference. See Paragraphs 4(a) and 4(d) for the pertinent provisions.*

Woodbridge Creek Comment 10 - Chevron should clarify if there were any impacts or sediment removal activities implemented as a result of the engineered wetlands between transect 6 and 8 along Woodbridge Creek and Spa Spring Creek.

*Chevron Response to Woodbridge Creek Comment 10 - The discharge area was closed during these activities until the engineered wetland was complete. No sediment was excavated from Woodbridge Creek and activities were isolated to the area where the work was completed. There were no impacts to sediment during the construction of the engineered wetlands.*

#### **NJDEP Specific Comments - Spa Spring Creek**

Spa Spring Creek Comment 1 - Background Sample: Chevron needs to establish an appropriate background location and apply the ProUCL method with a minimum of 8 samples.

*Chevron Response to Spa Spring Creek Comment 1 - Chevron will collect four (4) additional background samples along Spa Spring Creek to comply with USEPA's ProUCL method. The location of these additional background samples are included in the SFSAP.*

Spa Spring Creek Comment 2 - EPA requires additional sampling at all former transects and points for sub-surface sediment.

*Chevron Response to Spa Spring Creek Comment 2 – As discussed during the September 17, 2018 meeting and in Section 4.1.1 of the 2016 Supplemental BEE, the sediment lens at these locations is very thin (approx. 6”), and there is no subsurface sediment to be collected.*

Spa Spring Creek Comment 3 - Additional discrete samples or transects should be added as needed to investigate/delineate discharge areas identified as per General Comment 1 above.

*Chevron Response to Spa Spring Creek Comment 3 - The Spa Spring Creek adjacent to Chevron is relatively short distance, and there are already two transects and a sample collected from the DSN004 outfall location. In addition to the existing and planned background samples in Spa Spring Creek, additional transects will be added above and below the confluence of Spa Spring Creek and Woodbridge Creek. These locations will provide conditions related to Spa Spring Creek.*

Spa Spring Creek Comment 4 - Clarify the location of the former NJPDES discharge point on Spa Spring Creek relative to existing sample locations, how long this discharge point was in use, and what are the permit discharge limits.

*Chevron Response to Spa Spring Creek Comment 4 - The location of this discharge point is presented in the attached SFSAP, Figure 3. A history of this discharge point and the corresponding NJPDES Permit Number was described in Section 2.4.4 of the 2003 RFI report. A summary of the information is provided as Attachment 3.*

#### **NJDEP Specific Comments - Arthur Kill**

Arthur Kill Comment 1 - EPA is requiring additional sub-surface sampling along all former sampling points for all parameters.

*Chevron Response to Arthur Kill Comment 1 – During the 2002 sampling event, sediment sample cores from the Arthur Kill collected by Chevron did not show evidence of free product (see sediment boring logs, 2003 RFI Report, Appendix B). Additionally, as discussed during our September 17, 2018 meeting the two background samples collected by Chevron in the Arthur Kill in 2002 (SED-16-C and SED-17-C; results discussed in Section 9 of the 2003 RFI Report) showed higher concentrations of contaminants than the samples taken adjacent to Chevron. Additionally, the Chevron Dock area was subject to maintenance dredging, most recently event conducted by Chevron was in 2003 (discussed in Chevron Response to Arthur Kill Comment 3, below). Chevron therefore does not believe additional sampling and analysis in the Arthur Kill is necessary.*

Arthur Kill Comment 2 - Additional discrete samples or transects should be added as needed to investigate/delineate discharge areas identified as per General Comment 1 above.

*Chevron Response to Arthur Kill Comment 2 –As discussed above, Chevron believes that the existing sediment data from the Arthur Kill, as presented in the 2003 RFI Report, is sufficient and*

*additional sampling is not warranted.*

Arthur Kill Comment 3 - EPA is requesting additional information on the dates/location of dredging in the Arthur Kill.

*Chevron Response to Arthur Kill Comment 3 - As discussed at the September 17, 2018 meeting, Chevron's Arthur Kill dock area (Area A [Berths 2, 3 and 4] and Area B (Tanker Berth)) has been subject to prior maintenance dredging by Chevron. Dredging information for this area is provided in Attachment 5, including the 1997 NJDEP Land Use Permit for maintenance dredging and an aerial photograph base map with an outline of the dredged area that includes the location, depths and volumes associated with the dredging activities (Figure A-1). The dredging was completed during November 2003. The dredging material was approved for upland placement by the NJDEP as clean fill and was used as backfill in the former East Yard Basin.*

We look forward to your review and approval of the attached sediment investigation workplan. Chevron is committed to completing the final investigatory tasks specified in the HSWA Permit for the water bodies as soon as possible.

If you require additional information regarding this response letter or the attached workplan, please contact me at (732) 738-2023.

Sincerely,



Robert Mancini  
Project Manager, Downstream

cc: Lynn E. Vogel – NJDEP

Enclosures (as described)

# FIGURES





## ATTACHMENTS



## ATTACHMENT 1

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## **ATTACHMENT 1**

### **Sediment Field Sampling and Analysis Plan With QAPP**

**FORMER CHEVRON PERTH AMBOY FACILITY  
SUPPLEMENTAL FIELD SAMPLING AND ANALYSIS PLAN  
SEDIMENTS**

**EPA I.D. # NJD081982902**

**TRC Project No. 230668**

**Date: November 19, 2018**



**Prepared for:**

**Chevron USA**

**Prepared by:**

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**SUPPLEMENTAL FIELD SAMPLING AND ANALYSIS PLAN  
SEDIMENTS  
FORMER CHEVRON PERTH AMBOY FACILITY  
PERTH AMBOY, MIDDLESEX COUNTY, NEW JERSEY  
EPA I.D. # NJD081982902**

## **1.0 INTRODUCTION**

TRC Environmental Corporation (TRC), on behalf of Chevron USA (Chevron) has prepared this Supplemental Field Sampling and Analysis Plan (SFSAP) for collection and analysis of additional sediment samples from Woodbridge Creek, Spa Spring Creek, and the Arthur Kill proximate to the former Chevron facility located in the City of Perth Amboy, Middlesex County, New Jersey (the Facility). This SFSAP is being submitted pursuant to the Hazardous and Solid Waste Amendments (HSWA) Permit Renewal and Permit Modification I issued by the United States Environmental Protection Agency (EPA) in 2013 to Chevron USA, Inc. – Buckeye Perth Amboy Terminal LLC (EPA I.D. # NJD081982902). The Facility's 2013 HSWA Permit requires that the RCRA Facility Investigation (RFI) be completed for the three water bodies (see 2013 HSWA Permit, Module III, Condition B.2. Page 25 and 26). The investigation of these surface water bodies began in 2002 as part of the Facility wide RFI. This SFSAP proposes supplemental sediment sampling to complete this investigation, including data gaps identified in previous phases of the RFI for the three water bodies. Once completed, this sampling effort is intended to be the final phase of the RFI for the three water bodies.

The Facility is located near the confluence of Woodbridge Creek and the Arthur Kill in an older urban/industrial area of Perth Amboy (Figure 1). The SFSAP was prepared as part of the overall response to a letter from the USEPA, containing recommendations and comments from the New Jersey Department of Environmental Protection (NJDEP) dated August 31, 2018. The August 31, 2018 letter requested additional sediment sample collection in Facility-adjacent waters, as further discussed at a subsequent meeting on September 17, 2018 between Chevron, the USEPA, and the NJDEP. The SFSAP incorporates comments and information discussed during the meeting, and in the responses to the USEPA/NJDEP included in Chevron's letter dated November 15, 2018.

The Facility has completed several phases of a RCRA Facility Investigation (RFI) for the three surface water bodies pursuant to the HSWA Permit. In 2002, Chevron collected approximately 16 surface water samples and 44 sediment samples from water bodies adjacent to the Facility (Woodbridge Creek, Spa Spring Creek, and the Arthur Kill), some or all of which were analyzed for organic and inorganic chemical constituents including volatile organic compounds (VOCs), semi-VOCs (SVOCs), polychlorinated biphenyls (PCB), and Metals. The results of the 2002 surface water and sediment investigation were provided to NJDEP and EPA in the Baseline Ecological Evaluation (BEE) that was included as Section 9 in Chevron's November 2003 Resource Conservation and Recovery Act (RCRA) Facility Investigation Report (RFI Report) and Chevron's February 2008 Supplemental RFI Report (SRFI Report). The 2002 sediment sampling event identified various organic compounds (primarily SVOCs) and metals in various sediment samples. The presence of potentially petroleum stained sediments was identified at some locations based on field observations. Contaminants of Potential Ecological Concern (COPECs) were identified

and analytical results were compared to ecological screening criteria. Some sediment samples had concentrations of these compounds in excess of ecological screening criteria.

In 2014, Chevron conducted a supplemental sediment investigation of Spa Spring Creek and Woodbridge Creek to further investigate these waterbodies under the HSWA Permit and respond to comments raised by NJDEP and EPA on their review of Chevron's 2003 BEE Report. As part of the 2014 supplemental field work, Chevron completed 14 additional sediment cores and collected approximately 14 additional sediment samples from Woodbridge Creek and Spa Spring Creek. The results of this supplemental work were provided in Chevron's Supplemental Ecological Evaluation Report, dated 2016 (Supplemental EE). As part of the Supplemental EE, Chevron completed the re-evaluation of COPECs, collected additional sediment samples in Spa Spring Creek and Woodbridge Creek including analysis for Extractable Petroleum Hydrocarbons (EPH; this analytical method was not available during the prior 2002 investigation) and further evaluated potential contaminant migration pathways to surface water. In addition, a bathymetric survey was completed in the lower portion Woodbridge Creek.

## **1.1 SURFACE WATER BODIES**

Three surface water bodies border portions of the Facility along its northern boundary (Spa Spring Creek and Woodbridge Creek) and eastern boundary (Arthur Kill) (see Figure 2). In the vicinity of the Facility, Woodbridge Creek and Spa Spring Creek are tidal estuarine waters, with Woodbridge Creek having several prominent meanders along its course. Thus, water flow and elevation in the creeks are controlled by the diurnal tide cycle. Woodbridge Creek is bounded by mudflats and tidally-flowed wetlands, as well as numerous industrial properties. At high tide, the Creek is approximately 100 feet wide as it flows past the Facility. Woodbridge Creek empties into the Arthur Kill several hundred feet north of the Facility's East Yard.

In the vicinity of the Facility, Spa Spring Creek is a smaller, manmade channel that empties into Woodbridge Creek along the northern boundary of the Facility. Immediately upstream of the Facility, Spa Spring Creek flows through an industrial area. Prior to construction of the northern portion of the Facility's Main Yard, Spa Spring Creek naturally flowed through the location of the former North Field Basin (currently Chevron's wetlands creation project area).

The Arthur Kill itself is a tidal strait connecting the Kill van Kull and Newark Bay to the north with Raritan Bay and the Raritan River to the south. Tidal surges come from both ends, with an average flushing time of two weeks and an average semi-diurnal tidal range of 1.6 meters (5.3 feet). The major freshwater inputs are the major tributaries of the Arthur Kill: the Rahway River, the Elizabeth River, and the Fresh Kills, which contribute about 38 percent (122 cubic feet per second (ft<sup>3</sup>/sec)), with the balance of 62 percent (200 ft<sup>3</sup>/sec) coming from smaller tributaries, sewage treatment plants, combined sewer overflows, and industrial discharges. The salinity of the Arthur Kill varies from 17 to 27 ppt at the southern end to nearly freshwater in some of the tributary mouths. The Arthur Kill is an important industrial/commercial water way and is surrounded by one of the most densely populated coastal areas in the world.

Vast modifications of the physical features of the Arthur Kill were made to serve the New York/New Jersey harbor area. The highly industrialized waterway is dredged to an average

channel depth of nine meters (30 feet) and much of the shoreline is comprised of bulkheads or rip-rap. In addition to vegetated wetland areas, the vicinity contains extensive interspersed areas of man-made structures, including railroad yards, oil tank farms, bulkheads, docks, road systems, one of New York City's largest landfills, a power plant, former petroleum and metal refineries, and numerous industrial and residential buildings, both occupied and abandoned.

Historically, the Facility has discharged treated storm water and/or wastewaters to outfalls located in Spa Spring Creek and Woodbridge Creek. The Facility's current NJPDES permitted storm water/wastewater discharge (operated by the current owner, Buckeye Perth Amboy Terminal, LLC) is located in Woodbridge Creek.

## **1.2 OBJECTIVE**

The objective of the supplemental investigation is to complete the RFI of Woodbridge Creek, Spa Spring Creek, and the Arthur Kill, and thus fulfill the requirements set forth in the Facility's HSWA Permit. Specifically, this investigation is intended to supplement the prior investigations conducted in 2002 and 2014, in accordance with the August 31, 2018 USEPA/NJDEP letter and comments, as revised pursuant to the September 17, 2018 meeting.

## 2.0 METHODS AND STUDY DESIGN

This section outlines the proposed sampling methods and laboratory analyses for the proposed sediment sampling. The SFSAP will be implemented in accordance with the NJDEP's *Technical Requirements for Site Remediation* (TRSR), the NJDEP's *Ecological Evaluation Technical Guidance*, Version 2.0, August 2018 (EETG), and the NJDEP's 2005 *Field Sampling Procedures Manual* (FSPM). Details of sample collection, handling, and quality assurance are presented in the Quality Assurance Project Plan (QAPP) included as Appendix A. As noted above, the objective of the SFASP is to complete the RFI. The methods being employed to achieve this objective include supplementing the existing set of sediment data obtained from the sampling conducted in 2002 and 2014 with the data to be furnished from implementing the SFSAP. The sample locations, depth intervals and analytical parameters proposed herein are intended to be in accordance with the USEPA and NJDEP August 31, 2018 comments and technical discussion at the September 17, 2018 meeting and are considered sufficient to complete the RFI.

The field sampling proposed in the SFSAP will be targeted to sediment sampling locations within Woodbridge Creek, Spa Spring Creek, and the Arthur Kill. Field activities to be performed as part of the SFSAP are summarized as follows:

- Sediment sampling, to be completed utilizing Vibracore® drilling method where possible.
- Sediment sampling in some of the shallow surface water areas where a boat could not access may be obtained by hand, or a Ponar dredge in areas where utility mark outs prevent drilling due to utilities/pipelines.
- Field observations, characterization, and screening of sediment samples for field indications of contamination (e.g., photo-ionization detector [PID], odors, staining); and,
- Laboratory analysis of sediment samples for the similar analytical parameters as those analyzed in the 2002 and 2014 sediment investigations as presented in Section 2.2, below. Note that EPH did not exist as an approved petroleum hydrocarbon analytical method in 2002; sediment samples were analyzed for EPH during the 2014 sediment field investigation and EPH will be included in the analytical parameters proposed in this SFASP for this final phase of the investigation).

The results of this field work will be documented in a supplemental Woodbridge Creek, Spa Spring Creek and Arthur Kill RFI report. The supplemental report will be a comprehensive RFI report for the three water bodies incorporating the results of the prior Facility investigations.

## 2.1 SAMPLE COLLECTION

Samples will be collected from on-shore or from a boat that will navigate to each sediment location using shipboard Geographical Positioning System (GPS) equipment or equivalent. To the extent possible, the sampling program will proceed in a direction, upstream or downstream, opposite the tidal flow at the time of sampling. A total of up to 52 sediment samples will be collected for field screening and laboratory analysis. Table 1 provides a summary of all samples to be collected as proposed herein and the associated laboratory analytical parameters proposed for each sample. The location of the proposed sediment sample locations are shown on Figure 2. Final field sample locations may be adjusted based on field conditions at the time of sampling.

The sampling locations shown on Figure 2 were identified and discussed at the working session between Chevron, EPA, and NJDEP during the September 17, 2018 Facility meeting. A summary of the selection of sampling locations and analytical parameters can be found in Chevron's November 15, 2018 response letter to EPA, accompanying this SFSPWP. In summary the proposed sampling locations were selected to do one of three things (1) fill in data gaps with new sample locations, (2) provide additional background data as requested by EPA so that EPA's statistical background analysis as contained in the USEPA's ProUCL Guidance could be run, and (3) revisit previously sample locations to supplement analysis with shallow and/or deeper samples as well as EPH where it had not previously been analyzed.

**Additional Background Locations Woodbridge Creek:** Chevron will collect eight (8) additional background samples along Woodbridge Creek, in the vicinity of existing background location SED-10, to provide a more robust background data set for analysis with USEPA's ProUCL method. These additional background locations for Woodbridge Creek are designated as SED-WCBG-1 through SED-WCBG-8 on Figure 2 and Table 1. Sample depths and analytical parameters are provided on Table 1.

**Additional Background Locations Spa Spring Creek:** Chevron will collect four (4) additional background samples along Spa Spring Creek to provide a more robust background data set for analysis with USEPA's ProUCL method comply. These additional background locations are designated as SED-SSBG-1 through SED-SSBG-4 on Figure 2 and Table 1. Sample depths and analytical parameters are provided on Table 1.

**Data Gaps Woodbridge Creek New Boring Locations:** Chevron will add two additional transects (three borings per transect) in between SED-06 and SED-09. These additional transects are SED-23-A,B,C and SED-24-A,B,C as shown on Figure 2 and Table 1. Samples will be collected from the surface interval and from the subsurface interval exhibiting the greatest potential for contamination, determined by field observations.

Chevron will attempt to collect shallow sediment samples between existing transects SED-03 and SED-02. During the 2014 sampling event Chevron attempted to collect a VibraCore sample transect at this location. The pipeline companies which own and/or operate underground petroleum pipelines at this location refused to allow drilling access for safety reasons. Chevron will re-engage the underground utility owners and attempt to obtain a shallow transect using a Ponar or Ekman Dredge sampler. The feasibility of completing this transect depends on the access approval of the utility owners. This additional transect is SED-25-A,B,C as shown on Figure 3 and Table 1.

Chevron is also proposing an additional Woodbridge Creek transect between existing transects SED-01 and SED-02 even though this transect is not on or adjacent to Chevron property. This additional transect is SED-22-A,B,C as shown on Figure 2 and Table 1. Sample depths and analytical parameters are provided on Table 1.

**Data Gap Samples EPH Analysis at Existing Boring Locations:** Chevron will resample all past locations on Woodbridge Creek and Spa Spring Creek for EPH analysis where EPH was not analyzed previously. These EPH only sample locations are identified below and on Table 1. Their location can be found on Figure 2.

SED-01-A	SED-04-B	SED-07-C
SED-01-B	SED-04-C(R)	SED-08-A
SED-01-C	SED-05-A	SED-08-B
SED-02-A	SED-05-B	SED-09-A(R)
SED-02-B(R)	SED-05-C	SED-09-B
SED-02-C(R)	SED-06-A	SED-09-C(R)
SED-03-A	SED-06-B(R)	SED-10-A
SED-03-B(R)	SED-06-C	SED-10-B
SED-03-C(R)	SED-07-A	SED-10-C
SED-04-A	SED-07-B	

**Data Gap Additional Vertical Samples at Existing Boring Locations:** During the 2014, investigation only deeper samples were taken at boring locations SED-19-B and SED-19-C. Shallow samples to fill in this data gap will be taken at Sed-19-B and Sed-19-C. These two samples for the SED-19 transect are shown on Figure 2 and Table 1. Both samples will be analyzed for the full suite of parameters including EPH as shown on Table 1.

### 2.1.1 Sediment Sampling

Where possible and consistent with 2014 sediment sampling in Woodbridge Creek, sediment cores will be advanced using Vibracore® drilling methods to refusal or a total depth of 10 feet below the sediment surface, or to the top of the underlying parent material (till, clay, or sand units), whichever is first encountered. Sediment physical conditions and related field observations (e.g., color, texture, consistency, odors, visual indication of petroleum hydrocarbons, etc.) will be recorded with the field notes. The sediment samples will be screened with a calibrated photo-ionization detector (PID) and measurements recorded.

The goal of this investigation is to supplement the data set generated from the 2002 and 2014 sampling events. In general, samples will be collected from 4 new transects; older locations will be revisited in Woodbridge Creek, Spa Spring Creek and the Arthur Kill; and from additional background locations in Woodbridge Creek, Spa Spring Creek. Sampling locations are represented on Figure 2 and sample depths and analysis are summarized on Table 1. All locations will be advanced to the interface of the sediment and the parent material or refusal. While Vibracore® drilling is proposed for most sample collection, some sediment samples, including those between SED-02 and SED-03, will be collected manually from shallow intervals using a stainless steel Ponar dredge due to the presence of buried utilities or other hazards, subject to access being granted to collect samples by the operators of the local utilities.

## 2.2 SAMPLE ANALYSIS

The laboratory analytical parameters will generally match those from previous sediment sampling events conducted at the Facility in 2002 and 2014, as discussed during the September 2018 meeting. A summary of the proposed analytical methods for sediment samples is provided below:

### Sediment Analytical Parameters

<b>Parameter</b>	<b>Method</b>
Volatile Organic Compounds (TCL)	USEPA 8260C
Semi-volatile Organic Compounds (TCL)	8270D/8270D-SIM
Metals (TAL)	6010C, 7471B
Extractable Petroleum Hydrocarbons (EPH)	NJDEP EPH Method Revision 3
Grain size determination	D1498-76M
Total Organic Carbon (TOC)	Lloyd-Khan

TAL = USEPA Target Analyte List; see QAPP for specific list of analytes.

TCL = USEPA Target Compound List; see QAPP for specific list of analytes.

The laboratory analysis of sediment samples will be performed by a NJDEP-certified laboratory. Quality assurance procedures for sampling, sample handling/preservation, and laboratory requirements are described in the QAPP (Appendix A).

All samples collected from the 0-0.5 foot interval below the sediment surface will be analyzed for EPH (total and fractionated), with other parameters included in selected samples as noted in Table 1, which includes other sample information.

### **3.0 DELIEVERABLE**

A supplemental sediment investigation report will be prepared providing the results of the field work and laboratory sample analyses conducted as part of this field effort. The supplemental report will be a comprehensive report on all three water bodies, combining the results of the 2002 and 2014 surface water/sediment investigations into a final waterbody RFI report intended to fully address the relevant provisions of Module III Condition B.2. (Pages 25 and 26) of the Facility's 2013 HSWA Permit.

Similar to previous reports, sediment data obtained from this investigation will be screened against applicable ecological screening criteria. EPA's ProUCL software will be used to evaluate the expanded background data set to be obtained from Woodbridge Creek and Spa Spring Creek. The report will also incorporate the results of soil and groundwater data from adjacent SWMUs and AOCs. A review of the Facility's waste management practices as they potentially relate to the water bodies as well as relevant surrounding site history and land use will be provided. The type, nature, and extent of sediment contamination in the three water bodies will be provided in the report.

## 4.0 SCHEDULE

The proposed activities described in this workplan will be completed as follows, subject to timely EPA approval:

Pre-mobilization/mobilization:	1 Month Following Workplan Approval
Field sampling:	2 to 3 Months Following Workplan Approval
Laboratory testing and analysis:	3 to 4 Months Following Workplan Approval
Final Supplemental Sediment Report:	3 Months Following Receipt of Lab Data

Completion of field sampling and related activities will be conducted in accordance with safety protocols established by Chevron, and the anticipated schedule is subject to change based on operational conditions, weather, etc.

## 5.0 REFERENCES

New Jersey Department of Environmental Protection *Protocol for Addressing Extractable Petroleum Hydrocarbons* (Version 5.0). Site Remediation Program. August 9, 2010.

New Jersey Department of Environmental Protection *Extractable Petroleum Hydrocarbons Methodology*, Version 3.0. Site Remediation Program. August 2010.

New Jersey Department of Environmental Protection. August 2018. *Ecological Evaluation Technical Guidance*. (Ver. 2.0)

New Jersey Department of Environmental Protection May 2012 *Technical Requirements for Site Remediation*.

# FIGURES



## **FIGURES**





# TABLES


## TABLE

Table 1  
Proposed Sediment Sampling  
Former Perth Amboy Chevron Facility  
Perth Amboy, New Jersey  
Page 1 of 3

Sample Name	Sample Depth	Analysis	Location
SED-WCBG-1 <sup>2</sup>	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
SED-WCBG-2 <sup>2</sup>	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
SED-WCBG-3 <sup>2</sup>	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
SED-WCBG-4 <sup>2</sup>	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
SED-WCBG-5 <sup>2</sup>	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
SED-WCBG-6 <sup>2</sup>	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
SED-WCBG-7 <sup>2</sup>	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
SED-WCBG-8 <sup>2</sup>	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
SED-01-A	0.0-0.5	EPH	Woodbridge Creek
SED-01-B	0.0-0.5	EPH	Woodbridge Creek
SED-01-C	0.0-0.5	EPH	Woodbridge Creek
SED-02-A	0.0-0.5	EPH	Woodbridge Creek
SED-02-B(R)	0.0-0.5	EPH	Woodbridge Creek
SED-02-C(R)	0.0-0.5	EPH	Woodbridge Creek
SED-03-A	0.0-0.5	EPH	Woodbridge Creek
SED-03-B(R)	0.0-0.5	EPH	Woodbridge Creek
SED-03-C(R)	0.0-0.5	EPH	Woodbridge Creek
SED-04-A	0.0-0.5	EPH	Woodbridge Creek
	3.25-3.75	EPH	
SED-04-B	0.0-0.5	EPH	Woodbridge Creek
SED-04-C(R)	0.0-0.5	EPH	Woodbridge Creek
	1.5-2.0	EPH	
SED-05-A	0.0-0.5	EPH	Woodbridge Creek
SED-05-B	0.0-0.5	EPH	Woodbridge Creek
SED-05-C	0.0-0.5	EPH	Woodbridge Creek
SED-06-A	0.0-0.5	EPH	Woodbridge Creek
SED-06-B(R)	0.0-0.5	EPH	Woodbridge Creek
SED-06-C	0.0-0.5	EPH	Woodbridge Creek
SED-07-A	0.0-0.5	EPH	Spa Spring Creek

Table 1  
Proposed Sediment Sampling  
Former Perth Amboy Chevron Facility  
Perth Amboy, New Jersey  
Page 2 of 3

Sample Name	Sample Depth	Analysis	Location
SED-07-B	0.0-0.5	EPH	Spa Spring Creek
SED-07-C	0.0-0.5	EPH	Spa Spring Creek
SED-08-A	0.0-0.5	EPH	Spa Spring Creek
SED-08-C	0.0-0.5	EPH	Spa Spring Creek
SED-09-A(R)	0.0-0.5	EPH	Woodbridge Creek
SED-09-B	0.0-0.5	EPH	Woodbridge Creek
SED-09-C(R)	0.0-0.5	EPH	Woodbridge Creek
	0.5-1.0	EPH	
	4.5-5.0	EPH	
SED-10-A	0.0-0.5	EPH	Woodbridge Creek
SED-10-B	0.0-0.5	EPH	Woodbridge Creek
SED-10-C	0.0-0.5	EPH	Woodbridge Creek
SED-19-B	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
SED-19-C	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
SED-22-A	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
	TBD <sup>1</sup>	EPH, VOCs, SVOCs, Metals, TOC and grain size	
SED-22-B	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
	TBD <sup>1</sup>	EPH, VOCs, SVOCs, Metals, TOC and grain size	
SED-22-C	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
	TBD <sup>1</sup>	EPH, VOCs, SVOCs, Metals, TOC and grain size	
SED-23-A	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
	TBD <sup>1</sup>	EPH, VOCs, SVOCs, Metals, TOC and grain size	
SED-23-B	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
	TBD <sup>1</sup>	EPH, VOCs, SVOCs, Metals, TOC and grain size	
SED-23-C	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
	TBD <sup>1</sup>	EPH, VOCs, SVOCs, Metals, TOC and grain size	
SED-24-A	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
	TBD <sup>1</sup>	EPH, VOCs, SVOCs, Metals, TOC and grain size	
SED-24-B	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
	TBD <sup>1</sup>	EPH, VOCs, SVOCs, Metals, TOC and grain size	

Table 1  
Proposed Sediment Sampling  
Former Perth Amboy Chevron Facility  
Perth Amboy, New Jersey  
Page 3 of 3

Sample Name	Sample Depth	Analysis	Location
SED-24-C	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
	TBD <sup>1</sup>	EPH, VOCs, SVOCs, Metals, TOC and grain size	
SED-25-A <sup>3</sup>	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
SED-25-B <sup>3</sup>	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
SED-25-C <sup>3</sup>	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
SED-SSBG-1	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Spa Spring Creek
SED-SSBG-2	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Spa Spring Creek
SED-SSBG-3	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Spa Spring Creek
SED-SSBG-4	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Spa Spring Creek

<sup>1</sup> - TBD indicates the 6-inch sample interval To Be Determined based on field detectable evidence of contamination, or if no evidence, from 2-2.5 feet below the sediment surface or from 0.5-foot interval above parent material, whichever is first encountered.

<sup>2</sup> - Samples will be collected in the vicinity of the SED-10 transect, exact locations will be determined in the field

<sup>3</sup> - Pending utility approval, TRC will collect a shallow sediment sample using a Ponar Sampler

# APPENDICES

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## APPENDIX A



## **APPENDIX A:**

### **Quality Assurance Project Plan**

**QUALITY ASSURANCE PROJECT PLAN**  
**SUPPLEMENTAL FIELD SAMPLING AND ANALYSIS PLAN**  
**FORMER CHEVRON FACILITY**  
**1200 EAST STATE STREET - PERTH AMBOY, NEW JERSEY**  
**November 2018**

**Introduction**

TRC Environmental Corporation (TRC) has prepared the following *Quality Assurance Project Plan* (QAPP) for the November 2018 Supplemental Field Sampling and Analysis Plan (SFSAP) prepared for the former Chevron facility located in Perth Amboy, Middlesex County, New Jersey (the Site).

The SFSAP described collection and analysis of sediment samples in response to an August 31, 2018 letter from the New Jersey Department of Environmental Protection (NJDEP) and United States Environmental Protection Agency (USEPA) that requested further sampling and analysis of environmental media in Woodbridge Creek, Spa Spring Creek, and the Arthur Kill, all saline tidal waterways adjacent to the Site. The Supplemental Field Sampling and Analysis Plan (SFSAP) was prepared with respect to the agencies' comments in the letter, and in further discussion during a meeting between Chevron, the NJDEP and the USEPA on September 17, 2018. The data obtained from the proposed field activities and laboratory analysis will be compared to published NJDEP ecological screening criteria (ESCs) to further evaluate sediment quality in the aforementioned waters.

This QAPP was prepared in general accordance with the New Jersey Department of Environmental Protection's (NJDEP's) *Technical Requirements for Site Remediation* (TRSR; N.J.A.C. 7:26E-2.2) and the applicable sections of the NJDEP's *Quality Assurance Project Plan Technical Guidance* (QTG). It should be noted that the QAPP is respective of data quality indices that are not media specific, as described in Appendix B of the QTG, included herein as Attachment 1.

**Project/Problem Definition**

The SFSAP are being implemented to address the NJDEP/USEPA's request for additional data to further evaluate sediment in the Site-adjacent waterways. The contaminants of concern, which are also Contaminants of Potential Ecological Concern (COPECs) as defined by the NJDEP, were identified over the course of previous environmental and ecological investigations of sediments. The proposed sampling program includes analysis of the same parameters using the same methods employed in the prior investigations for consistency as per the September 2018 meeting. In addition to new locations, sampling will also be performed at selected former sediment sample locations. TRC intends to use the data in a future report.

**Project Objectives**

The primary objective of the proposed sampling is to provide the NJDEP/USEPA with sufficient data to satisfy the concerns presented in their August 2018 letter and September 2018 meeting, and concurrence among the attendees as to how best to address the agencies concerns.

Meeting the project objective will be supported by:

- Collection of sufficient sediment chemical data consistent with past investigations and as defined through discussions with regulatory reviewers and the chemical constituents listed in Attachment 2.
- Collection of sediment samples and laboratory analysis of the USEPA's parameters (as per prior investigations and as noted herein) for Woodbridge Creek and Spa Spring Creek.
- Collection of Total Organic Carbon (TOC) and sediment grain size distribution data.
- Field measurement of water quality parameters including pH, temperature, conductivity, salinity, oxidation-reduction potential, dissolved oxygen, and turbidity.

### **Data Quality Objectives**

The data quality objective (DQO) process was developed to define the acceptance criteria for the laboratory analytical data to be collected as part of the SFSAP. The acceptance criteria include precision, accuracy, representativeness, comparability, completeness and sensitivity. Specific Data Quality Indicators (DQIs) for the investigation are briefly discussed below:

#### **Precision:**

Precision will be determined by collecting field duplicate samples for analysis at a rate of 1 per 20 sediment samples, if sufficient sample volume is obtainable. Duplicate samples will be co-located with the associated field sample. Duplicate sample results are to be evaluated based upon the Reportable Percent Difference (RPD) and unless otherwise noted, the higher of the concentrations are to be used. Acceptable RPD values are outlined in the New Jersey Data of Known Quality (NJDKQP) acceptance criteria for each method.

#### **Accuracy:**

Data accuracy will be determined through laboratory compliance with the applicable DQIs identified in Attachment 1, including adherence to sample preservation and holding times, instrument calibration, analysis of method blanks and duplicates, matrix spike analyses, spiking, etc as outlined per NJ DKQP Technical Guidance.

#### **Representativeness:**

Sampling locations and methodology, in accordance with the SFSAP, were chosen and designed to generate data representative of site conditions with regards to COPECs. The SFSAP includes collection of samples/media biased towards suspected areas of contamination based upon previous studies and at targeted areas representative of historically-detected petroleum contamination across a range of concentrations. Required sample quantities and volumes to be collected are consistent with the SFSAP and laboratory analytical method requirements.

### Comparability

The data collected for sediment sample analysis will be analyzed per standard USEPA methods as outlined in the Analytical Data/Quality Assurance Table included in this QAPP. No data from the Site has been collected from biological tissues for analysis to-date with respect to the proposed analyses. It is anticipated that the resultant data will be comparable to that obtained from similar studies completed for the Site using the same sample preparation and analytical methods. Physical parameter data (grain size, TOC) will also be comparable to that historically collected at the Site.

Analyses will be performed by the following New Jersey-certified laboratories:

<b>Laboratory</b>	<b>NJDEP Certification No.</b>	<b>Analyses to be Performed</b>
<b>TRC</b> 41 Spring Street New Providence, NJ 07974 908-988-1700 Contact: Matt Beaupre	20043	Water Quality Indicator Parameters – pH, temperature, specific conductance, salinity, and dissolved oxygen
<b>Eurofins Lancaster Laboratories Environmental, LLC</b> 2425 New Holland Pike, Lancaster, PA 17605 717-656-2300 Contact: Megan Moeller	12129	TAL/TCL (VOC, SVOC, Metals); EPH, TOC, Grain Size Distribution, Percent Solids

### Completeness

It is anticipated that 100% of the proposed samples will be usable with respect to analytical completeness. However, sampling completeness may fall below 100% due to the behavior and mobility of biota at the Site. Therefore, it is possible that some samples will not be collected (*e.g.*, if no fish are available due to seasonally low water conditions, etc.). Where this occurs, an explanation will be provided in the investigation report regarding the lack of data, which will be described as the percentage of samples collected with respect to the planned number of samples.

### Sensitivity

Sensitivity requirements are a function of the laboratory's analytical reporting limits (RLs), which are summarized in Attachment 2 for each analytical. It is expected that laboratories RL's and/or Method Detection Limits (MDL's) will achieve the necessary Project Quantitation Limits (PQL's).

### Project Team Responsibilities

This section identifies the contact information and the responsibilities of management, quality assurance (QA), field and laboratory personnel involved with this project.

<b>Personnel</b>	<b>Title</b>	<b>Organization</b>	<b>Telephone No.</b>	<b>Responsibilities</b>
Todd Reinold	<b>Project Manager</b>	TRC	908-988-1725 908-358-4656	Oversees technical aspects of project and primary contact with client project
Eric O'Conner	<b>Site Safety Officer</b>	TRC	908-988-1737 551-208-4155	Health & Safety Bayway and LPS Supervisor
Eric O'Conner	<b>Field Team Leader</b>	TRC	908-988-1737 551-208-4155	Supervises field sampling and coordinates all field activities, communicates with Project Manager
Dr. Robert Lippencott	<b>TRC Technical Director</b>	TRC	908-988-1628	Oversees field measurement equipment, internal quality assurance program and staff adherence to Standard
Megan Moeller	<b>Contract Laboratory Project Manager</b>	Eurofins Lancaster Laboratories	717-656-2300	Oversees project in laboratory and laboratory staff adherence to Standard Operating Procedures; maintains contact with TRC

### **Management Responsibilities**

#### **Project Manager**

The Project Manager will serve as the primary point of contact to the client for technical matters as they relate to the project plans and regularly communicate with the Technical Director and Field Team Leader. The Project Manager will ensure that all the technical, administrative and regulatory compliance objectives are met on a day-to-day basis. Other duties may include:

- Assisting with project task scoping and conceptual model development,
- Assuring adherence to project plans and obtaining approvals for any changes to these plans,
- Assuring that approved procedures meet project objectives,
- Coordinating field and office activities with the Field Team Leader and Contract Laboratory Project Manager(s)
- Initiating corrective actions,
- Monitoring schedules for field, analytical and data validation activities associated with the field sampling and office activities;
- Reviewing and editing key technical deliverables;
- Assigning duties to project staff and orienting the staff to the specific needs and requirements of the project;
- Assisting in the coordination of all field tasks, communications, reports, and technical reviews, and other support functions, and facilitating activities with the technical requirements of the

- project;
- Scheduling and coordinating field and office activities with the Principal-in-Charge, Project QA Manager, and Field Team Manager;
- Implementing recommendations made by the Project Technical Director/QA Manager,
- Ensuring the successful completion of the project in terms of budget, schedule, and data quality objectives;
- Interpreting site data and providing input into the development and finalization of key technical deliverables; and,
- Maintaining the project file.

### **Quality Assurance Responsibilities**

#### **Project Technical Director**

The Project Technical Director/QA Manager has the overall responsibility for quality assurance oversight. The Project QA Manager will communicate directly with the Principal-in-Charge, the Project Manager and the Field Team Leader. Aside from the QA role, he oversees and provides corrective action suggestions on the technical aspects of the project. Specific responsibilities may include:

- Reviewing and approving QA procedures;
- Delegation of QA review tasks to staff;
- Assuring adherence to the QAPP and documenting any approved changes to the project plans;
- Ensuring that QA audits of the various project phases are conducted as required;
- Providing technical QA assistance to project staff;
- Following up on corrective actions;
- Ensuring that data collection is conducted in accordance with the QAPP; and,
- Reporting on the adequacy, status and effectiveness of the QA program.

### **Field Responsibilities**

#### **Field Team Leader and Site Safety Officer**

The Field Team Leader and Site Safety Officer have the overall responsibility for the completion of all field activities in accordance with the QAPP and the other project plans and is the

communication link between the field team, subcontractors and TRC project management. Specific responsibilities may include:

- Understanding and implementing the QAPP;
- Mobilizing and demobilizing the field team and subcontractors to and from the Site;
- Coordinating activities in the field;
- Assigning specific duties to field team members;
- Ensuring site security and access;
- Overseeing and coordinating field data collection in accordance with the workplan;
- Resolving logistical problems that could hinder the implementation of field activities or meeting specific data quality objectives, including equipment malfunctions, weather-dependent working conditions or personnel conflicts;
- Implementing field quality control procedures including issuing and tracking of measurement testing equipment, the proper labeling, handling, storage and shipment of samples, chain-of-custody procedures, and control and collection of field documentation;
- Summarizing and interpreting site data;
- Providing input into the development and finalization of key technical deliverables;
- Ensuring that all field activities are being implemented in accordance with the Health and Safety Plan (HASP);
- Evaluating new hazards and operation changes when necessary; and,
- Correcting all HASP non-compliance situations immediately and stopping work in cases of immediate danger.

#### Field Staff

The Field Staff will report directly to the Field Team Leader. The responsibilities of the field team may include:

- Understanding and implementing the QAPP requirements as they relate to their specified duties;
- Collecting samples and field measurements and decontaminating equipment in accordance with NJDEP guidance and the documented procedures stated in the QAPP;
- Ensuring that field instruments are properly calibrated, operated, and maintained and that adequate documentation is maintained for all instruments;
- Collecting the required QA samples and documenting the QA sample collection details,
- Ensuring that field documentation is complete, legible and accurate; and,
- Documenting and communicating any non-conformance or potential data quality issues to the Field Team Leader.

#### **Laboratory Responsibilities**

##### TRC Laboratory Project Manager

The TRC Laboratory Project Manager is ultimately responsible for the data produced by the laboratory. Specific responsibilities may include:

- Implementing and adhering to QA and corporate policies and procedures with TRC's laboratory;
- Approving Standard Operating Procedures (SOPs);
- Maintaining adequate staffing and equipment; and,
- Reviewing internal/external audits findings and implementing corrective actions.

#### Laboratory QA Manager

The Laboratory QA Manager reports directly to the TRC Laboratory Project Manager. Specific responsibilities may include:

- Approving the laboratory SOPs;
- Ensuring and improving quality within the laboratory;
- Supervising and providing guidance and training to laboratory staff;
- Addressing all client inquiries involving data quality issues;
- Performing QA audits and assessments;
- Tracking internal and external findings of QA audits; and,
- Coordinating laboratory certification and accreditation programs.

#### Contract Laboratory Project Manager

The Contract Laboratory Project Manager is the primary point of contact between the contract laboratory and TRC. Specific responsibilities may include:

- Maintaining communication with the client and contract laboratory staff on project status;
- Monitoring, reviewing and evaluating the progress and performance of projects;
- Reporting client inquiries involving data quality issues or data acceptability to Laboratory QA Manager and the operations staff; and,
- Reviewing data packages for completeness and compliance to client requirements/specifications.

#### Laboratory Analyst/Technician

Each analyst or technician is responsible for:

- Evaluating instrument performance;
- Performing technical procedures and data recording in accordance with documented procedures;
- Performing and documenting calibration and preventative maintenance;
- Performing data processing and data review procedures;
- Reporting non-conformance to the Laboratory Manager or other appropriate personnel; and,
- Ensuring sample and data integrity by adhering to internal chain-of-custody procedures.

#### Laboratory Sample Custodian

The Sample Custodian ensures the implementation of proper sample receipt procedures,

including maintenance of the chain-of-custody. Other responsibilities may include:

- Notifying the Laboratory Project Manager of any discrepancies with incoming samples;
- Logging samples into the laboratory tracking system;
- Ensuring that all samples are stored in the proper equipment; and,
- Overseeing sample disposal.

### **Sample Collection and Documentation**

All investigation activities to be conducted will be consistent with the TRSR, NJDEPS 2005 *Field Sampling Procedures Manual* (FSPM), the EETG and the Workplan.

A record of all field observations and procedural methodologies will be kept in bound field books throughout the duration of the field effort. The TRC field team will review all field notes recorded each day for legibility, accuracy and completeness. The field notes will include the date, names and affiliation of personnel on-site, chronology of activities including entry and exit times, weather conditions, level of personnel protection, site observations, field equipment measurements, sampling details, sketches and diagrams, information pertaining to photographs, page number and the signature of the author. All directives given by the Project Manager and other field decisions related to the additional delineation sampling will be recorded in the field book (e.g., area to be further delineated, sampling rationale, new sampling identification numbers, and analytical parameters).

Site maps will be maintained, and all sampling locations will be marked in the field. Plotted data can include GPS coordinates and photograph identification numbers.

### **Sample Handling and Custody Requirements**

All sample identification will follow or be consistent with the sampling summary tables provided in the sampling workplan. The establishment of a standard sample designation/labeling protocol is essential to ensure adequate quality assurance/quality control and to allow tracking of each sample and the associated analytical data. Proper labeling allows for tracking of sampling beginning from the time of sample collection, through analysis, and following project completion should future data correlation be deemed necessary. The sample identification will be recorded on the chain-of-custody forms accompanying each sample shipment and recorded in the field books.

The TRC field personnel will coordinate with the laboratory for shipment and receipt of sample containers and coolers. Upon completion of sampling, the chain-of-custody will be filled out and returned with the samples to the laboratory. An important consideration for the collection of environmental data is the ability to demonstrate that the analytical samples have been obtained from pre-determined locations and that they have reached the laboratory without alteration. Evidence of collection, shipment, laboratory receipt, and laboratory custody until disposal must be documented to accomplish this. Documentation will be accomplished through a chain-of-custody form that records each sample and the names of the individuals responsible for sample collection, transport, and receipt. Sample custody will be initiated by field personnel upon collection of samples. Sample labels will be securely affixed to each sample container. Sample labels will clearly identify the

sample, and can include the following information:

- Site name and designated project number;
- Sampling location;
- Sample matrix (media type), e.g., animal tissue type (rodent, crab, fish, soil, etc.)
- Sample identification number (following the unique sample identification included on the media specific sampling summary tables);
- Date and time the sample was collected, and;
- Sample preservation.

The TRC field personnel will physically inspect all sample containers prepared for pickup or shipment prior to shipment. Samples will be packaged to prevent breakage or leakage during transport and will be delivered to the laboratory by a laboratory sample courier, TRC or an overnight delivery service.

The chain-of-custody will be carefully reviewed by TRC field personnel and compared with the contents of the accompanying cooler to confirm the accuracy of the custody record. Each individual who has the samples in his or her possession will sign the chain-of-custody. The original chain-of-custody record will be sealed in a watertight envelope and placed inside the shipping container. The shipping container will be sealed prior to being given to the laboratory sample courier.

Upon delivery at the laboratory, the laboratory sample custodian (or designated laboratory technician) will take possession of the samples. The sample custodian will open the shipping container, verify that the custody tape is intact, examine all sample containers for damage, measure and record the cooler temperature, compare the cooler contents with the chain-of-custody, verify that the holding times have not been exceeded, record, and sign and date the chain-of-custody record. The sample custodian will record any discrepancies or problems on the chain-of custody record and notify the Contract Laboratory Project Manager, who will subsequently notify the TRC Project Manager or QA Manager.

In addition, the sample custodian will notify the Laboratory Project Manager of the sample arrival. The sample custodian will attach labels with a unique laboratory identification to each sample container and place them in proper laboratory storage. The samples will be entered into the laboratory tracking system with all pertinent information including lab tracking number, project name, TRC sample identification, type of sample media, requested analysis, data and time of lab receipt of samples, and sample collection time and date. Evidence of the chain-of-custody and additional documentation will be placed in a file maintained by the laboratory.

### **Sample Quality Assurance and Quality Control**

A New Jersey-certified laboratory will provide all sample containers for all environmental and quality assurance samples to be collected. If proposed as part of the workplan, duplicate samples, equipment field blanks and trip blanks will be collected during each sampling event for the same analytical parameters being proposed to assess and validate the quality of data generated. Field blanks are collected from decontaminated sampling equipment at a rate of one per day or 1 per 20

samples (whichever is less). Trip blanks are made by the laboratory and are transported in the coolers with the sample containers. Trip blanks are to be submitted to the laboratory at a rate of 1 per 20 VOC samples. Duplicates are generally collected at a rate of one for every 20 samples collected and analyzed for the same analytical parameters. Matrix spike/matrix spike duplicate (MS/MSD) samples are generally collected at a rate of one for every 20 samples collected. Additional sample volume will be collected to allow the laboratory to perform the MS/MSD testing when available.

The following Analytical Methods / Quality Assurance Summary Tables summarize the sampling program for all environmental and quality assurance samples to be collected.

## Analytical Methods / Quality Assurance Summary Table

Matrix	Analysis	Number of Samples (estimated)	Field Duplicates	Trip Blanks	Field Equipment Blanks	Sample Volume/ Container (number, size and type)	Preservation	Maximum Holding Time (prep/ analysis)	Analytical Method
Sediment	Grain Size Distribution	TBD	NA	N/A	NA	1 32 Oz Glass	Sealed and cooled to 4°C	6 Months	ASTM D422-63
Sediment	TCL Volatile Organics	TBD	1 / 20 samples	1/20 samples	1/20 samples	3x5 gram Encore samplers	Sealed and cooled to 4°C	48 hours	8260C
Sediment	TCL Semi Volatile Organics	TBD	1 / 20 samples	NA	1/20 samples	1 4 oz Glass	Sealed and cooled to 4°C	Extraction: 14 Days Solid Analysis: 40 Days	8270D/SI M
Sediment	TAL Metals	TBD	1 / 20 samples	N/A	1/20 samples	1 4 oz Glass	Sealed and cooled to 4°C	6 Months for 6010; 28 days for 7471	6010/7471
Sediment	Total Organic Carbon	TBD	1 / 20 samples	N/A	NA	1 2 oz Glass	Sealed and cooled to 4°C	28 Days	9060A
Sediment	pH	TBD	NA	N/A	NA	1 4 Oz Glass	Sealed and cooled to 4°C	ASAP (24 hours)	SM4500

### **Field Equipment Calibration**

All field equipment will be calibrated in accordance with the manufacturer's instructions and the Equipment Calibration Table provided below. In addition, all equipment to record water quality indicator parameters will be calibrated in accordance with the manufacturer's instructions and TRC's standard operating procedures (SOPs) for the water quality indicator parameters (e.g., pH, temperature, specific conductance and dissolved oxygen) per TRC's Quality Control Manual and under TRC New Jersey DEP Certified laboratory certification.

Any equipment which provides unusual responses or questionable results will be re-calibrated or replaced to ensure satisfactory equipment performance. If extreme vapor concentrations are measured during field screening, the equipment will be re-calibrated to ensure proper field measurements. Any equipment that has been shown to be defective, will be deactivated, labeled and stored at a specified place until it can be repaired.

The TRC sampling team will record the daily field equipment calibration activities in the field book with a clear description of equipment type, manufacturer name and identification number, calibration test performed and results, time and date.

**Field Equipment Calibration Table**

Sampling Equipment	Calibration/Maintenance Activity	Frequency	Acceptance Criteria	Correction Action	Responsible Person
Temperature	Calibration in accordance with Equipment Manual	Calibrated Quarterly	NA	NA	Field Team Leader
pH	Calibration in accordance with Equipment Manual	Daily - before Use	The buffer checks should be within +/- 0.2 of the true values	Re-Calibrate or Service	Field Team Leader
Conductivity	Calibration in accordance with Equipment Manual	Daily - before Use	NA	NA	Field Team Leader
Dissolved Oxygen	Calibration in accordance with Equipment Manual	Daily - before Use	Refer to Manual	Re-Calibrate or Service	Field Team Leader

### **Field Equipment Decontamination**

All disposable, dedicated sampling equipment will be used only once and discarded after sampling. All reusable field sampling equipment will be appropriately decontaminated after each use.

The following decontamination sequence is the minimum that will be employed on all reusable field sampling equipment prior to and following sample collection events. This decontamination procedure may be expanded to include additional decontamination steps, in conformance with the NJDEP's *Field Sampling Procedures Manual*.

- Non-phosphate detergent plus tap water wash
- Tap water rinse
- Distilled/deionized water rinse
- Air dry
- Wrap Equipment in Aluminum (or Place in Plastic Bag)

All fluids generated during decontamination activities will be handled in accordance with the NJDEP's *Field Sampling Procedures Manual*.

### **Laboratory Deliverables**

Upon receipt of laboratory results for various sampling events, TRC will evaluate the data for accuracy and validity. All analytical data will be submitted in hard copy and in an electronic deliverable format which adheres to the guidelines specified in the NJDEP's *Site Remediation Program Electronic Data Interchange Manual*.

In accordance with these requirements, TRC will complete a HAZSITE Data Entry Application for the individual laboratory data sets generated and include the information on a diskette with the report submittal to NJDEP. The HAZSITE application is electronic, menu driven, specifies all required fields and valid entries, and includes administrative checks. In addition, these data will be summarized in tabular form and plotted on site maps for submission to NJDEP.

**ATTACHMENT 1:**

**Method Specific DQI Tables (Appendix B of NJDEP Quality Assurance Project  
Plan Technical Guidance)**

**Table 1 QAPP Worksheet All Matrices – Metals (ICP) USEPA SW-846 6010B  
Measurement Performance Criteria & QC Samples**

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Linear Dynamic Range (LDR)	At a minimum the LDR should be checked every 6 months	A minimum of 3 different concentration standards across the ICP range; one should be near the upper limit of the range.	NA	Analyst
Accuracy	A	Initial Calibration	Daily prior to sample analysis	Minimum of a calibration blank plus a standard per manufacturing recommended procedures; RL standard may be included in multi-point calibration curve; linear curve fit with correlation coefficient $\geq 0.995$ .	Re-optimize instrument and re-calibrate, repeat until successful	Analyst
Accuracy	A	Initial Calibration Verification (ICV)	Daily after calibration	Separate-source from calibration standards; must contain all target analytes ICV: 90-110% recovery	Re-analyze; if still out, Re-calibrate as required by method; suspend all analysis until ICV meets criteria	Analyst
Accuracy	A	Initial Calibration Blanks (ICB)	After ICV	Must be matrix-matched (and same concentration of acid found in standards and samples); ICB: $< \pm RL$	Re-analyze ; if still out, Re-calibrate and reanalyze.	Analyst
Accuracy	A	Continuing Calibration Verification (CCV)	1 of every 10 samples and at end of run	Same source as calibration standards; conc. near mid-point of calibration curve; must contain all target analytes CCV: 90 - 110% recovery	Re-analyze; if still out, Re-calibrate and reanalyze. all samples since last acceptable CCV	Analyst

**Table 1 QAPP Worksheet All Matrices – Metals (ICP) USEPA SW-846 6010B  
Measurement Performance Criteria & QC Samples**

<b>Data Quality Indicator (DQI)</b>	<b>QC Measure for Sampling (S), Analytical (A), or both (S&amp;A)</b>	<b>QC Sample or Activity</b>	<b>Frequency / Number</b>	<b>QC Acceptance Limits (Measurement Performance Criteria)</b>	<b>Corrective Action (CA)</b>	<b>Person(s) Responsible for CA</b>
Sensitivity	A	Continuing Calibration Blanks (CCB)	After each CCV	Must be matrix-matched (and same conc. of acid found in standards and samples); CCB: $\leq \pm$ RL	Re-calibrate, if still out, Re-calibrate and reanalyze.	Analyst
Accuracy & Sensitivity (Contamination)	A	Method Blank (MB)	1 per digestion batch - not to exceed 20 field samples	Must be digested with samples using same preparation method and amount of acids; MB: $<$ RL	Re-analyze; if still out redigest & re-analyze all samples unless all detected results $>$ 10x MB level	Analyst
Accuracy	A	Interference Check Standards (ICSA and ICSAB)	Daily after calibration	ICSA & ICSB: 80-120% recovery ICSA: non-spiked analytes $\leq 2$ x RL	Re-analyze; if still out; adjust interference and background correction, and/or linear ranges as needed & recalibrate and reanalyze all field samples since last complaint ICSA & ICSB	Analyst/Data Reviewer
Accuracy	A	Laboratory Control Sample (LCS)	1 per digestion batch - not to exceed 20 field samples	Must contain all target analytes and be matrix-specific; Aq. LCS: 80- 120% recovery; Soil/Sediment/solid LCS: vendor control limits (95% confidence limits)	Re-analyze, if still out; redigest & Re-analyze LCS & all field samples in batch	Analyst/Data Reviewer
Precision	A	Sample Duplicate (DUP)	1 per $\leq 20$ field samples if an MS/MSD was not performed	Must be performed on a Site field sample. For soil and aqueous samples: Results $\geq 5$ xRL, RPD $\leq 20\%$ aqueous, 35% solids; Results $<$ 5xRL: absolute difference between results $\leq$ RL.	Re-analyze, qualify data	Analyst/Data Reviewer

**Table 1 QAPP Worksheet All Matrices – Metals (ICP) USEPA SW-846 6010B  
Measurement Performance Criteria & QC Samples**

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	S & A	Matrix Spike (MS) [Site-specific QC]	1 per $\leq 20$ field samples	Must be performed on a Site field sample; MS: 75-125% recovery; professional judgment if sample concentration > 4x spike level	Evaluate LCS, unspiked sample and qualify data	Analyst/Data Reviewer
Precision	S & A	Matrix Spike Duplicate (MSD) [Site-specific QC]	1 per < 20 field samples	Must be performed on a Site field sample. For soil and aqueous samples: Results $\geq 5xRL$ , RPD $\leq 20\%$ aqueous, 35% solids; Results < 5xRL: absolute difference between results $\leq RL$ .	Lab narrates outlier; qualify data	Analyst/Data Reviewer
Accuracy	A	Post digestion spike	1 per $\leq 20$ field samples if less than acceptable accuracy and precision data are generated	Should be performed if MS/MSD recoveries were unacceptable: 80-120% recovery	Lab narrates outlier; qualify data	Analyst/Data Reviewer
Accuracy	A	Serial Dilution	1 per $\leq 20$ field samples if less than acceptable accuracy and precision data are generated	Perform 5x dilution on same sample used for MS. % Difference $\leq 10\%$ for results >50x IDL (which will most likely equate to 10X RL).	Lab narrates outlier qualify data	Analyst/Data Reviewer
Accuracy	A	Quantitation	Not applicable	RL $\leq$ results $\leq$ linear calibration range on a sample-specific basis. Report all Aq. results in $\mu g/L$ or $mg/L$ and all Soil/Sediment results in $mg/Kg$ on a dry-weight basis.	Perform dilution to bring analyte within linear range; report from diluted analysis	Analyst/Data Reviewer
Overall Precision & Representativeness	S & A	Field Duplicate Sample [Site-specific QC]	1 per 20 field samples	Aq.: Results $\geq 5xRL$ : RPD $\leq 30\%$ ; Results < 5xRL: professional judgment; Soil/Sediment: Results $\geq 5xRL$ : RPD $\leq 50\%$ ; Results < 5xRL: professional judgment	Potential data usability issue; indication of sample heterogeneity	Data Reviewer

**Table 1 QAPP Worksheet All Matrices – Metals (ICP) USEPA SW-846 6010B  
Measurement Performance Criteria & QC Samples**

<b>Data Quality Indicator (DQI)</b>	<b>QC Measure for Sampling (S), Analytical (A), or both (S&amp;A)</b>	<b>QC Sample or Activity</b>	<b>Frequency / Number</b>	<b>QC Acceptance Limits (Measurement Performance Criteria)</b>	<b>Corrective Action (CA)</b>	<b>Person(s) Responsible for CA</b>
Accuracy (preservation)	S & A	Sample preservation	every field sample	Aq.: Total Metals: HNO <sub>3</sub> pH < 2; (Dissolved Metals: filter on site or at the lab then HNO <sub>3</sub> pH < 2 but cannot be used for regulatory compliance) Soil/Sediment: collect unpreserved per SW-846 Chapter 3 Table 3-2	Lab narrates outlier. Potential data usability issue	Data Reviewer
Data Completeness	S & A	Calculate from valid/usable data collected	Not applicable	Minimum $\geq 90\%$ Overall	Potential data usability / data gap issue	Data Reviewer/ Investigator
Accuracy/ Sensitivity	S & A	Holding Time (HT)	every field sample	For aqueous and soil samples six months. If Soil/Sediment samples are frozen, HT arrested and HT begins when thawed. Samples can be maintained frozen for 1 year from collection.	Lab narrates outlier. Potential data usability issue	Data Reviewer
Accuracy & Sensitivity (Contamination)	S & A	Equipment Rinsate Blank (EB)	Not Required if using dedicated sampling equipment. If performing decontamination of equipment, collect 1 EB per 20 field samples collected by the same method	Aqueous EB: < RL Soil/Sediment EB <RL on solid equivalent basis	Aqueous Potential data usability issue, Soil/Sediment: non-matrix matched aqueous EB use professional judgment	Data Reviewer
Comparability	S & A	Based on Method (SOP) and QAPP/FSP protocols	Not applicable	Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples.	Potential data usability issue	Data Reviewer/ Investigator

**NOTES:**

1. This table was prepared by NJDEP, April 2014 to be compliant with EPA Region 2 guidance and meet the data quality needs of the Department.
2. Method References = USEPA SW-846 Method 6010B (*Inductively Coupled Plasma-Mass Spectrometry*, December 1996 and February 2007) and (*Quality Assurance and Quality Control Requirements and Performance Standards for SW846 Method 6010B, Trace Metals by Inductively Coupled Plasma Atomic Emission Spectrometry (ICP)*).

**Table 2 QAPP Worksheet All Matrices – Metals (ICP) USEPA SW-846 6010C  
Measurement Performance Criteria & QC Samples**

<b>Data Quality Indicator (DQI)</b>	<b>QC Measure for Sampling (S), Analytical (A), or both (S&amp;A)</b>	<b>QC Sample or Activity</b>	<b>Frequency / Number</b>	<b>QC Acceptance Limits (Measurement Performance Criteria)</b>	<b>Corrective Action (CA)</b>	<b>Person(s) Responsible for CA</b>
Accuracy	A	Linear Dynamic Range (LDR)	At a minimum the LDR should be checked every 6 months	A minimum of 3 different concentration standards across the ICP range one should be near the upper limit of the range.	NA	Analyst
Accuracy	A	Initial Calibration	Daily prior to sample analysis	Minimum of a calibration blank plus a standard per manufacturing recommended procedures; RL standard may be included in multi-point calibration curve; linear curve fit with correlation coefficient $\geq 0.998$ .	Re-optimize instrument and re-calibrate, repeat until successful	Analyst
Accuracy	A	Initial Calibration Verification (ICV)	Daily after calibration	Separate-source from calibration standards; must contain all target analytes ICV: 90-110% recovery	Re-analyze; if still out, Re-calibrate as required by method; suspend all analysis until ICV meets criteria	Analyst
Sensitivity	A	Low Level Initial Calibration Verification	For method 6010C, LLICV must be analyzed at the beginning of the run before any samples and at the end of the run.	Same source as calibration standards; must contain all target analytes at the RL 70-130% recovery	Re-analyze. If still out, Re-calibrate/re-analyze. Suspend all analyses until LLICV meets criteria unless all results $> 10 \times$ RL	Analyst
Accuracy	A	Initial Calibration Blanks (ICB)	After ICV	Must be matrix-matched (and same conc. of acid found in standards and samples); ICB: $< \pm$ RL	Re-analyze ; if still out, Re-calibrate and reanalyze.	Analyst

**Table 2 QAPP Worksheet All Matrices – Metals (ICP) USEPA SW-846 6010C  
Measurement Performance Criteria & QC Samples**

<b>Data Quality Indicator (DQI)</b>	<b>QC Measure for Sampling (S), Analytical (A), or both (S&amp;A)</b>	<b>QC Sample or Activity</b>	<b>Frequency / Number</b>	<b>QC Acceptance Limits (Measurement Performance Criteria)</b>	<b>Corrective Action (CA)</b>	<b>Person(s) Responsible for CA</b>
Accuracy	A	Continuing Calibration Verification (CCV)	1 every 10 samples and at end of run	Same source as calibration standards; conc. near mid-point of calibration curve; must contain all target analytes CCV: 90 - 110% recovery	Re-analyze; if still out, Re-calibrate and reanalyze. All samples since last acceptable CCV	Analyst
Sensitivity	A	Low Level Continuing Calibration Verification	For method 6010C, LLCCV must be analyzed at the beginning of the run before any samples and at the end of the run.	Same source as initial calibration standards; must contain all target analytes at the RL 70-130% recovery	Re-analyze. If still out, Re-calibrate/re-analyze. Suspend all analyses until LLICV meets criteria unless all results > 10x RL	Analyst
Sensitivity	A	Continuing Calibration Blanks (CCB)	After each CCV	Must be matrix-matched (and same conc. of acid found in standards and samples); CCB: < $\pm$ RL	Re-analyze ; if still out, Re-calibrate and reanalyze.	Analyst
Accuracy & Sensitivity (Contamination )	A	Method Blank (MB)	1 per digestion batch - not to exceed 20 field samples	Must be digested with samples using same preparation method and amount of acids; MB: < RL	Re-analyze; if still out redigest & re-analyze all samples unless all detected results > 10x MB level	Analyst

**Table 2 QAPP Worksheet All Matrices – Metals (ICP) USEPA SW-846 6010C  
Measurement Performance Criteria & QC Samples**

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Interference Check Standards (ICSA and ICSAB)	Daily after calibration	ICSA & ICSB: 80-120% recovery ICSA: non-spiked analytes $\leq 2 \times$ RL	Re-analyze; if still out, adjust interference and background correction, and/or linear ranges as needed & recalibrate and reanalyze all field samples since last complaint ICSA & ICSB	Analyst/Data Reviewer
Accuracy	A	Laboratory Control Sample (LCS)	1 per digestion batch - not to exceed 20 field samples	Must contain all target analytes and be matrix-specific; Aq. LCS: 80- 120% recovery; Soil/Sediment/sol-id LCS: vendor control limits (95% confidence limits)	Re-analyze, if still out' redigest & Re-analyze LCS & all field samples in batch	Analyst/Data Reviewer
Precision	A	Sample Duplicate (DUP)	1 per < 20 field samples if an MS/MSD was not performed	Must be performed on a Site field sample. For soil and aqueous samples: Results $\geq 5 \times$ RL, RPD $\leq 20\%$ aqueous, 35% solids; Results < 5xRL: absolute difference between results $\leq$ RL.	Re-analyze, qualify data	Analyst/Data Reviewer
Accuracy	S & A	Matrix Spike (MS) [Site-specific QC]	1 per $\leq 20$ field samples	Must be performed on a Site field sample; MS: 75-125% recovery; professional judgment if sample concentration > 4x spike level	Evaluate LCS, unspiked sample and qualify data	Analyst/Data Reviewer
Precision	S & A	Matrix Spike Duplicate (MSD) [Site-specific QC]	1 per < 20 field samples  —	Must be performed on a Site field sample. For soil and aqueous samples: Results $\geq 5 \times$ RL, RPD $\leq 20\%$ aqueous, 35% solids; Results < 5xRL: absolute difference between results $\leq$ RL.	Lab narrates outlier; qualify data	Analyst/Data Reviewer

**Table 2 QAPP Worksheet All Matrices – Metals (ICP) USEPA SW-846 6010C  
Measurement Performance Criteria & QC Samples**

<b>Data Quality Indicator (DQI)</b>	<b>QC Measure for Sampling (S), Analytical (A), or both (S&amp;A)</b>	<b>QC Sample or Activity</b>	<b>Frequency / Number</b>	<b>QC Acceptance Limits (Measurement Performance Criteria)</b>	<b>Corrective Action (CA)</b>	<b>Person(s) Responsible for CA</b>
Accuracy	A	Post digestion spike	1 per $\leq 20$ field samples if less than acceptable accuracy and precision data are generated	Should be performed if MS/MSD recoveries were unacceptable: 80-120% recovery	Lab narrates outlier; qualify data	Analyst/Data Reviewer
Accuracy	A	Serial Dilution	1 per $\leq 20$ field samples if less than acceptable accuracy and precision data are generated	Perform 5x dilution on same sample used for MS % Difference < 10% for results >10x RL.	Lab narrates outlier qualify data	Analyst/Data Reviewer
Accuracy	A	Quantitation	Not applicable	RL $\leq$ results $\leq$ linear calibration range on a sample-specific basis. Report all Aq. results in $\mu\text{g/L}$ or $\text{mg/L}$ and all Soil/Sediment results in $\text{mg/Kg}$ on a dry-weight basis.	Perform dilution to bring analyte within linear range; report from diluted analysis	Analyst/Data Reviewer
Overall Precision & Representativeness	S & A	Field Duplicate Sample [Site-specific QC]	1 per 20 field samples	Aq.: Results $\geq 5\text{xRL}$ : RPD $\leq 30\%$ ; Results < 5xRL: professional judgment; Soil/Sediment: Results $\geq 5\text{xRL}$ : RPD $\leq 50\%$ ; Results < 5xRL: professional judgment	Potential data usability issue; indication of sample heterogeneity	Data Reviewer
Accuracy (preservation)	S & A	Sample preservation	every field sample	Aq.: Total Metals: $\text{HNO}_3$ pH < 2; (Dissolved Metals: filter on site or at the lab then $\text{HNO}_3$ pH < 2 but cannot be used for regulatory compliance) Soil/Sediment: collect unpreserved per SW-846 Chapter 3 Table 3-2	Lab narrates outlier. Potential data usability issue	Data Reviewer

**Table 2 QAPP Worksheet All Matrices – Metals (ICP) USEPA SW-846 6010C  
Measurement Performance Criteria & QC Samples**

<b>Data Quality Indicator (DQI)</b>	<b>QC Measure for Sampling (S), Analytical (A), or both (S&amp;A)</b>	<b>QC Sample or Activity</b>	<b>Frequency / Number</b>	<b>QC Acceptance Limits (Measurement Performance Criteria)</b>	<b>Corrective Action (CA)</b>	<b>Person(s) Responsible for CA</b>
Data Completeness	S & A	Calculate from valid/usable data collected	Not applicable	Minimum $\geq$ 90% Overall	Potential data usability / data gap issue	Data Reviewer/ Investigator
Accuracy/ Sensitivity	S & A	Holding Time (HT)	every field sample	For aqueous and soil samples six months. If Soil/Sediment samples are frozen, HT arrested and HT begins when thawed. Samples can be maintained frozen for 1 year from collection.	Lab narrates outlier. Potential data usability issue	Data Reviewer
Accuracy & Sensitivity (Contamination )	S & A	Equipment Rinse Blank (EB)	Not Required if using dedicated sampling equipment. If performing decontamination of equipment, collect 1 EB per 20 field samples collected by the same method	Aqueous EB: < RL Soil/Sediment EB <RL on solid equivalent basis	Aqueous Potential data usability issue, Soil/Sediment: non-matrix matched aqueous EB use professional judgment	Data Reviewer
Comparability	S & A	Based on Method (SOP) and QAPP/FSP protocols	Not applicable	Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples.	Potential data usability issue	Data Reviewer/ Investigator

**NOTES:**

1. This table was prepared by NJDEP, January 2012 to be compliant with EPA Region 2 guidance and meet the data quality needs of the Department.
2. Method References = USEPA SW-846 Method 6010C (*Inductively Coupled Plasma-Mass Spectrometry*, Revision 3 February 2007).

**Table 3 QAPP Worksheet All Matrices - Mercury SW-846 Method 7471B and 7470A**  
**Measurement Performance Criteria & QC Samples Table– Mercury**

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Initial Calibration	Daily prior to sample analysis	Minimum of 5 calibration levels plus blank; low level standard at level of RL; linear regression with a correlation coefficient $r \geq 0.995$	Re-optimize instrument and re-calibrate, repeat until successful	Analyst
Accuracy	A	Initial Calibration/ Initial Calibration Verification (ICV)	Daily after calibration	Separate-source from calibration standards; ICV: 90-110% recovery	Re-analyze; if still out, Re-calibrate as required by method; suspend all analysis until ICV meets criteria	Analyst
Accuracy	A	Continuing Calibration Verification (CCV)	1 of every 10 samples and at end of run	Same source as calibration standards; conc. near mid-point of calibration curve; CCV: -80 - 120% recovery	Re-analyze and, if still out, Re-calibrate and Re-analyze all samples since last acceptable CCV	Analyst
Sensitivity	A	Initial and Continuing Calibration Blanks (ICB and CCB)	After ICV and after each CCV	Must be matrix-matched (and same conc. of acid found in standards and samples); CCB: $< \pm RL$	Re-analyze; if still out, Re-calibrate, reanalyze.	Analyst
Sensitivity	A	Low Level Calibration Check Standard	Daily only if RL standard is not included in initial calibration	Low Level Check Standard: 70-130% recovery	Recalibrate/reanalyze unless all results $> 10x RL$	Analyst
Accuracy & Sensitivity (Contamination)	A	Method Blank (MB)	1 per digestion batch - not to exceed 20 field samples	Must be digested with samples using same preparation method and amount of acids; MB: $< RL$	Re-analyze; if still out redigest & re-analyze all samples unless all detected results $> 10x MB$ level	Analyst

**Table 3 QAPP Worksheet All Matrices - Mercury SW-846 Method 7471B and 7470A**  
**Measurement Performance Criteria & QC Samples Table– Mercury**

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Laboratory Control Sample (LCS)	1 per digestion batch - not to exceed 20 field samples	Must be matrix-specific; aqueous LCS: 80-120% recovery; Soil/Sediment LCS vendor control limits (95% confidence)	Re-analyze, if still out; redigest (soil/sed.) & Re-analyze LCS & all field samples in batch	Analyst/ Data Reviewer
Precision	A	Sample Duplicate (DUP)	1 per <20 field samples if an MS/MSD was not performed	Must be performed on a Site field sample. Aq.: Results RPD $\leq$ 20%; Soil/Sediment: Results, RPD $\leq$ 35%;	Re-analyze, qualify data	Analyst/ Data Reviewer
Accuracy	S & A	Matrix Spike (MS) [Site-specific QC]	1 per $\leq$ 20 field samples	Must be performed on a Site field sample; MS: 75-125% recovery; professional judgment if sample concentration > 4x spike level	Evaluate LCS, unspiked sample, re-analyze, if necessary, and qualify data	Analyst/ Data Reviewer
Precision	S & A	Matrix Spike Duplicate (MSD) [Site-specific QC]	1 per <20 field samples	Must be performed on a Site field sample Aq.: Results $\geq$ 5xRL, RPD $\leq$ 20%; Results < 5xRL: absolute difference between results $\leq$ RL. Soil/Sediment: Results $\geq$ 5xRL, RPD $\leq$ 35%; Results < 5xRL: absolute difference between results $\leq$ 2xRL	Lab narrates outlier; Re-analyze, qualify data	Analyst/ Data Reviewer
Accuracy	A	Quantitation	Not applicable	RL $\leq$ results $\leq$ upper calibration range on a sample-specific basis. Report all Aq. results in $\mu\text{g/L}$ or $\text{mg/L}$ and all Soil/Sediment results in $\text{mg/Kg}$ on a dry-weight basis.	Perform dilution to bring analyte within linear range, report from diluted analysis	Analyst/ Data Reviewer
Overall Precision & Representativeness	S & A	Field Duplicate Samples [Site-specific QC]	1 per 20 field samples	Aq.: Results $\geq$ 5xRL: RPD $\leq$ 30%; Results < 5xRL: professional judgment; Soil/Sediment: Results $\geq$ 5xRL: RPD $\leq$ 50%; Results < 5xRL: professional judgment	Potential data usability issue; indication of sample heterogeneity	Data Reviewer

**Table 3 QAPP Worksheet All Matrices - Mercury SW-846 Method 7471B and 7470A  
Measurement Performance Criteria & QC Samples Table– Mercury**

<b>Data Quality Indicator (DQI)</b>	<b>QC Measure for Sampling (S), Analytical (A), or both (S&amp;A)</b>	<b>QC Sample or Activity</b>	<b>Frequency / Number</b>	<b>QC Acceptance Limits (Measurement Performance Criteria)</b>	<b>Corrective Action (CA)</b>	<b>Person(s) Responsible for CA</b>
Accuracy (preservation)	S & A	Temperature Blank or other Cooler Temperature Reading	1 Temperature reading per cooler to be recorded upon receipt at lab	Soil/Sediment: $\leq 6^{\circ}$ C per SW-846 Chapter 3 Table 3-2 but allow for $< 2^{\circ}$ C if freezing samples are intact	Lab narrates outlier; Potential data usability issue	Data Reviewer
Accuracy (preservation)	S & A	Sample preservation	Every field sample	Aq.: Total Metals: $\text{HNO}_3$ pH $< 2$ ; (Dissolved Metals: filter on site or at the lab then $\text{HNO}_3$ pH $< 2$ but cannot be used for regulatory compliance) Soil/Sediment: collect unpreserved and keep cold (see above)	Potential data usability issue	Data Reviewer
Accuracy/ Sensitivity	S & A	Holding Time (HT)	Every field sample	Aqueous and Soil/Sediment: HT = 28 days from collection to analysis if Soil/Sediment samples are frozen, HT arrested and HT begins when thawed. Samples can be maintained frozen for 1 year from collection.	Lab narrates outlier; Potential data usability issue	Data Reviewer
Accuracy & Sensitivity (Contamination )	S & A	Equipment Rinsate Blank (EB)	Not Required if using dedicated sampling equipment. If performing decontamination of equipment, collect 1 EB per 20 field samples collected by the same method	Aqueous EB: $< \text{RL}$ Soil/Sediment EB $< \text{RL}$ on solid equivalent basis	Aqueous potential data usability issue, Soil/Sediment: non-matrix matched aqueous EB use professional judgment	Data Reviewer
Data Completeness	S & A	Calculate from valid/usable data collected	Not applicable	Minimum $\geq 90\%$ Overall	Potential data usability / data gap issue	Data Reviewer/ Investigator

**Table 3 QAPP Worksheet All Matrices - Mercury SW-846 Method 7471B and 7470A  
Measurement Performance Criteria & QC Samples Table– Mercury**

<b>Data Quality Indicator (DQI)</b>	<b>QC Measure for Sampling (S), Analytical (A), or both (S&amp;A)</b>	<b>QC Sample or Activity</b>	<b>Frequency / Number</b>	<b>QC Acceptance Limits (Measurement Performance Criteria)</b>	<b>Corrective Action (CA)</b>	<b>Person(s) Responsible for CA</b>
Comparability	S & A	Based on Method (SOP) and QAPP/FSP protocols	Not applicable	Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples.	Potential data usability issue	Data Reviewer/ Investigator

**NOTES:**

1. This table was prepared by NJDEP, April 2014 to be compliant with EPA Region 2 guidance and meet the data quality needs of the Department.
2. Method References = USEPA SW-846 Method 7471B (*Mercury in Solid or Semisolid Waste by Manual Cold Vapor Technique*, February 2007) and USEPA SW-846 Method 7470A (*Mercury in Aqueous Samples by Manual Cold Vapor Technique*, September 1994).

**Table 4 QAPP Worksheet All Matrices – VOAs by USEPA SW-846 8260B**  
**Measurement Performance Criteria & QC Samples**

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	BFB Tune	Every 12 hours	Method tune criteria based on criteria in Table 4 of USEPA-SW846 Method 8260B	Perform instrument maintenance; reanalyze until acceptable	Analyst
Accuracy	A	Initial Calibration (ICAL)	Initially and when CCV fails	Minimum 5-standards; must contain all targets and lowest standard $\leq$ RL; Full Scan: RF for SPCCs Section 7.3.5.4; %RSD $\leq$ 15% for all compounds except CCC's which must be $\leq$ 30% RSD or "r" $\geq$ 0.99; SIM: %RSD $\leq$ 20% or "r" $\geq$ 0.99 for all compounds; regression analysis, if used, must not be forced through the origin	Recalibrate as required by method; analysis cannot proceed without a valid initial calibration	Analyst
Accuracy/ Sensitivity	A	Method Blank	1 per preparatory batch of up to 20 field samples (matrix-specific)	Targets analytes must be < RL except for common laboratory contaminants (acetone, methylene chloride and MEK) which must be < 5x RL, surrogates in criteria	Reanalyze and, if necessary, re-extract. Report non-conformance in narrative; compounds present in blank should be flagged "B" in samples, if detected.	Analyst
Accuracy	A	Matrix Spike/ Matrix Spike Duplicate [Site-specific QC]	1 per $\leq$ 20 field samples per matrix	Must contain all target analytes, performed on Site field sample, % recovery 70-130% except for difficult analytes** which must exhibit % recovery between 40-160%	Evaluate LCS, unspiked sample, reanalyze, if necessary, and qualify data and narrate issue	Analyst/Data Reviewer

**Table 4 QAPP Worksheet All Matrices – VOAs by USEPA SW-846 8260B**  
**Measurement Performance Criteria & QC Samples**

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Precision	A	Matrix Spike/ Matrix Spike Duplicate [Site-specific QC]	1 per $\leq 20$ field samples per matrix	Must contain all target analytes, performed on Site field sample, recovery criteria same as MS; RPDs $\leq 20\%$ for waters and $\leq 30\%$ for solids	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Accuracy	A	Laboratory Control Sample (LCS)	1 per preparatory batch of up to 20 samples	Must contain all target analytes, be matrix-matched; % Recovery 70- 130% except for difficult analytes ** must exhibit percent recoveries between 40-160%.	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Precision	A	Sample Duplicate (DUP)	1 per $\leq 20$ field samples if a MS/MSD was not performed	Must be performed on a Site field sample. RPDs $\leq 20\%$ for waters and $\leq 30\%$ for solids for results $> 2x$ RL	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Accuracy	A	Surrogates	Every sample including QC	Minimum of 3 surrogates at retention times across GC run for all matrices; surrogates must be between 70- 130% for all compounds.	Reanalyze, if necessary, qualify data	Analyst/Data Reviewer
Accuracy	A	Internal Standards (IS)	3 per sample including QC	Minimum of 3 IS , Areas 50-200% of the most recent CCV; RTs $\pm 30$ sec. from midpoint ICAL standard	Reanalyze and qualify data	Analyst/Data Reviewer
Accuracy	A	Continuing Calibration Verification (CCV)	1 every 12 hours prior to analysis of samples	Concentration level near mid-point of ICAL curve containing all target compounds; <i>Full Scan and SIM</i> : min RRF criteria met; %D or % Drift $\leq 20\%$ for all compounds	Recalibrate as required by method; note outliers in narrative.	Analyst

**Table 4 QAPP Worksheet All Matrices – VOAs by USEPA SW-846 8260B**  
**Measurement Performance Criteria & QC Samples**

<b>Data Quality Indicator (DQI)</b>	<b>QC Measure for Sampling (S), Analytical (A), or both (S&amp;A)</b>	<b>QC Sample or Activity</b>	<b>Frequency / Number</b>	<b>QC Acceptance Limits (Measurement Performance Criteria)</b>	<b>Corrective Action (CA)</b>	<b>Person(s) Responsible for CA</b>
Accuracy	A	Quantitation	Every sample	RL $\leq$ results $\leq$ upper calibration range on a sample-specific basis; IS must be used; and average response factors or curve-statistics generated from the ICAL must be used for quantitation. Results reported between the MDL and RL qualified "J"	Perform dilution to bring analyte within linear range, qualify data	Analyst/Data Reviewer
Sensitivity	A	Reporting of Non-Detects	Every sample	Reported at the sample-specific RL which must be $\leq$ PRL	Potential data usability issue	Data Reviewer
Overall Precision & Representativeness	S & A	Field Duplicate Samples [Site-specific QC]	1 per 20 field samples	RPD $\leq$ 30% for waters or RPD $\leq$ 50% for solids w/results $>$ 2x RL; Professional judgment for results $<$ 2xRL	Potential data usability issue	Data Reviewer
Accuracy (preservation)	S	Temperature Blank or other Cooler Temperature Reading	1 Temperature reading per cooler to be recorded upon receipt at lab	$\leq$ 6° C; allow for $<$ 2° C if samples intact sample preservation per SW-846 Chapter 4 Table 4-1	Potential data usability issue	Data Reviewer
Accuracy/ Sensitivity	S & A	Holding Time (HT)	Every field sample	Analyses within 14 days of collection (7 days if unpreserved). Aqueous samples adjust pH to $<$ 2 with HCL or per SW-846 Table 4-1 preservatives.	Potential data usability issue	Data Reviewer

**Table 4 QAPP Worksheet All Matrices – VOAs by USEPA SW-846 8260B  
Measurement Performance Criteria & QC Samples**

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy/ Sensitivity	S	Equipment Blank [Site-specific QC]	Not Required if using dedicated sampling equipment. If performing decontamination of equipment, collect 1 EB per 20 field samples collected by the same method.	Target analytes < RL	Potential data usability issue	Data Reviewer
Data Completeness	S & A	Calculate from valid/usable data collected	Not applicable	≥ 90% Overall	Potential data usability / data gap issue	Data Reviewer/ Investigator
Comparability	S & A	Based on Method (SOP) and QAPP/FSP protocols	Not applicable	Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples.	Potential data usability issue	Data Reviewer/ Investigator

**NOTES:**

1. This table was prepared by NJDEP, April 2014, to be compliant with EPA Region 2 guidance and meets the data quality needs of the Department.
2. Volatile Organic Compound analyses via USEPA SW-846 Method 8260B (*Quality Assurance and Quality Control Requirements for SW-846 Method 8260B* or 8260C *Volatile Organic Compounds by Gas Chromatography/Mass Spectroscopy [GC/MS]*).

\*\* Potentially “difficult” analytes include: acetone, methyl ethyl ketone, 4-methyl-2-pentanone, 2-hexanone, dichlorodifluoromethane, bromomethane, chloromethane, carbon disulfide, 1,2-Dibromo-3-chloropropane, chloroethane, naphthalene, trichlorofluoromethane, and 1, 4- dioxane.

**Table 5 QAPP Worksheet All Matrices – VOAs by USEPA SW-846 8260C**  
**Measurement Performance Criteria & QC Samples**

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	BFB Tune	Every 12 hours	Method tune criteria based on criteria in Table 3 of USEPA-SW846 Method 8260C	Perform instrument maintenance; reanalyze until acceptable	Analyst
Accuracy	A	Initial Calibration (ICAL)	Initially and when CCV fails	Minimum 5-standards; must contain all targets and lowest standard $\leq$ RL; Full Scan: %RSD $\leq$ 20% for all compounds and minimum RF found in Table 4 or "r" $\geq$ 0.99; SIM: %RSD $\leq$ 20% and minimum RF found in Table 4 or "r" $\geq$ 0.99 for all compounds;	Recalibrate as required by method; analysis cannot proceed without a valid initial calibration	Analyst
Accuracy/ Sensitivity	A	Method Blank	1 per preparatory batch of up to 20 field samples (matrix-specific)	Targets analytes must be $<$ RL except for common laboratory contaminants (acetone, methylene chloride and MEK) which must be $<$ 5x RL, surrogates in criteria	Reanalyze and, if necessary, re-extract. Report non-conformance in narrative; compounds present in blank should be flagged "B" in samples, if detected.	Analyst
Accuracy	A	Matrix Spike/ Matrix Spike Duplicate [Site-specific QC]	1 per $\leq$ 20 field samples per matrix	Must contain all target analytes, performed on Site field sample, % recovery 70-130% except for difficult analytes** which must exhibit % recovery between 40-160%	Evaluate LCS, unspiked sample, reanalyze, if necessary, and qualify data and narrate issue	Analyst/Data Reviewer

**Table 5 QAPP Worksheet All Matrices – VOAs by USEPA SW-846 8260C**  
**Measurement Performance Criteria & QC Samples**

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Precision	A	Matrix Spike/ Matrix Spike Duplicate [Site-specific QC]	1 per $\leq 20$ field samples per matrix	Must contain all target analytes, performed on Site field sample, recovery criteria same as MS; RPDs $\leq 20\%$ for waters and $\leq 30\%$ for solids	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Accuracy	A	Laboratory Control Sample (LCS)	1 per preparatory batch of up to 20 samples	Must contain all target analytes, be matrix-matched; % Recovery 70- 130% except for difficult analytes ** must exhibit percent recoveries between 40-160%.	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Precision	A	Sample Duplicate (DUP)	1 per $\leq 20$ field samples if a MS/MSD was not performed	Must be performed on a Site field sample. RPDs $\leq 20\%$ for waters and $\leq 30\%$ for solids for results $> 2x$ RL	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Accuracy	A	Surrogates	Every sample including QC	Minimum of 3 surrogates at retention times across GC run for all matrices; surrogates must be between 70- 130% for all compounds.	Reanalyze, if necessary, qualify data	Analyst/Data Reviewer
Accuracy	A	Internal Standards (IS)	3 per sample including QC	Minimum of 3 IS , Areas 50-200% of the most recent midpoint CCV standard; RTs $\pm 30$ sec. from midpoint ICAL standard	Reanalyze and qualify data	Analyst/Data Reviewer
Accuracy	A	Continuing Calibration Verification (CCV)	1 every 12 hours prior to analysis of samples	Concentration level near mid-point of ICAL curve containing all target compounds; <i>Full Scan and SIM</i> : min RRF criteria met; %D or % Drift $\leq 20\%$ for all compounds	Recalibrate as required by method; note outliers in narrative.	Analyst

**Table 5 QAPP Worksheet All Matrices – VOAs by USEPA SW-846 8260C  
Measurement Performance Criteria & QC Samples**

<b>Data Quality Indicator (DQI)</b>	<b>QC Measure for Sampling (S), Analytical (A), or both (S&amp;A)</b>	<b>QC Sample or Activity</b>	<b>Frequency / Number</b>	<b>QC Acceptance Limits (Measurement Performance Criteria)</b>	<b>Corrective Action (CA)</b>	<b>Person(s) Responsible for CA</b>
Accuracy	A	Quantitation	Every sample	RL $\leq$ results $\leq$ upper calibration range on a sample-specific basis; IS must be used; and average response factors or curve-statistics generated from the ICAL must be used for quantitation. Results reported between the MDL and RL qualified "J"	Perform dilution to bring analyte within linear range, qualify data	Analyst/Data Reviewer
Sensitivity	A	Reporting of Non-Detects	Every sample	Reported at the sample-specific RL which must be $\leq$ PRL	Potential data usability issue	Data Reviewer
Overall Precision & Representativeness	S & A	Field Duplicate Samples [Site-specific QC]	1 per 20 field samples	RPD $\leq$ 30% for waters or RPD $\leq$ 50% for solids w/results $>$ 2x RL; Professional judgment for results $<$ 2xRL	Potential data usability issue	Data Reviewer
Accuracy (preservation)	S	Temperature Blank or other Cooler Temperature Reading	1 Temperature reading per cooler to be recorded upon receipt at lab	$\leq$ 6° C; allow for $<$ 2° C if samples intact sample preservation per SW-846 Chapter 4 Table 4-1	Potential data usability issue	Data Reviewer
Accuracy/ Sensitivity	S & A	Holding Time (HT)	Every field sample	Analyses within 14 days of collection (7 days if unpreserved). Aqueous samples adjust pH to $<$ 2 with HCL or per SW-846 Table 4-1 preservatives.	Potential data usability issue	Data Reviewer

**Table 5 QAPP Worksheet All Matrices – VOAs by USEPA SW-846 8260C  
Measurement Performance Criteria & QC Samples**

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy/ Sensitivity	S	Equipment Blank [Site-specific QC]	Not required if using dedicated sampling equipment. If performing decontamination of equipment, collect 1 EB per 20 field samples collected by the same method	Target analytes < RL	Potential data usability issue	Data Reviewer
Data Completeness	S & A	Calculate from valid/usable data collected	Not applicable	≥ 90% Overall	Potential data usability / data gap issue	Data Reviewer/ Investigator
Comparability	S & A	Based on Method (SOP) and QAPP/FSP protocols	Not applicable	Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples.	Potential data usability issue	Data Reviewer/ Investigator

**NOTES:**

1. This table was prepared by NJDEP, April 2014, to be compliant with EPA Region 2 guidance and meets the data quality needs of the Department.
2. Volatile Organic Compound analyses via USEPA SW-846 Method 8260C (*Quality Assurance and Quality Control Requirements for SW-846 Method 8260C or 8260C Volatile Organic Compounds by Gas Chromatography/Mass Spectroscopy [GC/MS]*).

\*\* Potentially “difficult” analytes include: acetone, methyl ethyl ketone, 4-methyl-2-pentanone, 2-hexanone, dichlorodifluoromethane, bromomethane, chloromethane, carbon disulfide, 1,2-Dibromo-3-chloropropane, chloroethane, naphthalene, trichlorofluoromethane, and 1, 4- dioxane.

**Table 6 QAPP Worksheet All Matrices – - SVOAs by USEPA SW-846 8270C  
Measurement Performance Criteria & QC Samples**

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	DFTPP Tune	Every 12 hours	Method tune criteria based on criteria in Table 3 of USEPA-SW846 Method 8270C	Perform instrument maintenance; reanalyze until acceptable	Analyst
Accuracy	A	Initial Calibration (ICAL)	Initially and when CCAL fails	Minimum 5-standards; must contain all targets and lowest standard $\leq$ RL; <i>Full Scan</i> : RF $\geq$ 0.05 for SPCCs; %RSD $\leq$ 15% for all compounds except CCCs which must be $\leq$ 20% RSD or "r" $\geq$ 0.99; <i>SIM</i> : %RSD $\leq$ 20% or "r" $\geq$ 0.99 for all compounds	Recalibrate as required by method; analysis cannot proceed without a valid initial calibration	Analyst
Accuracy/ Sensitivity	A	Method Blank	1 per extraction batch of up to 20 field samples	Must be matrix matched; Phthalates < 5xRL; All other Targets < RL, surrogates in criteria	Reanalyze and, if necessary, re-extract. Report non-conformance in narrative; compounds present in blank should be flagged "B" in samples, if detected.	Analyst
Accuracy	A	Matrix Spike/ Matrix Spike Duplicate [Site-specific QC]	1 per $\leq$ 20 field per matrix samples	Must contain all target analytes, performed on Site field sample, % recovery 70-130% except for difficult analytes** which must exhibit % recovery between 20-160%	Evaluate LCS, unspiked sample, reanalyze, if necessary, and qualify data and narrate issue	Analyst/Data Reviewer

**Table 6 QAPP Worksheet All Matrices – - SVOAs by USEPA SW-846 8270C**  
**Measurement Performance Criteria & QC Samples**

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Precision	A	Matrix Spike/ Matrix Spike Duplicate [Site-specific QC]	1 per $\leq 20$ field per matrix samples	Must contain all target analytes, performed on Site field sample, % recovery criteria same as MS. RPDs $\leq 20\%$ for waters and $\leq 30\%$ for solids	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Accuracy	A	Laboratory Control Sample (LCS)	1 per extraction batch of up to 20 samples	Must contain all target analytes, be matrix-matched; % Recovery 70- 130% except for difficult analytes ** must exhibit percent recoveries between 20-160%.	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Precision	A	Sample Duplicate (DUP)	1 per < 20 field samples if an MS/MSD was not performed	Must be performed on a Site field sample. RPD $\leq 20\%$ for waters and $\leq 30\%$ for solids for results > 2x RL	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Accuracy	A	Surrogates	Every sample including QC	Minimum of 3 base-neutral and 3 acid surrogates at RTs across GC run; for solids matrices must be between 30-130% for all compounds; for water matrices 30-130% for BN surrogates and 15-110% for Acid surrogates	Reanalyze, if necessary, qualify data	Analyst/Data Reviewer
Accuracy	A	Internal Standards (IS)	6 per sample including QC	Minimum of 6 IS , Areas 50-200% of the most recent CCV standard; RTs $\pm 30$ sec. from midpoint ICAL standard	Reanalyze and qualify data	Analyst/Data Reviewer
Accuracy	A	Continuing Calibration Verification (CCV)	1 every 12 hours prior to analysis of samples	Concentration level near mid-point of ICAL curve containing all target compounds; <i>Full Scan</i> : %D or %Drift $\leq 20\%$ for CCCs and $\leq 30\%$ for all other compounds <i>S/M</i> : %D or %Drift $\leq 30\%$	Recalibrate as required by method; note outliers in narrative.	Analyst

**Table 6 QAPP Worksheet All Matrices – - SVOAs by USEPA SW-846 8270C**  
**Measurement Performance Criteria & QC Samples**

<b>Data Quality Indicator (DQI)</b>	<b>QC Measure for Sampling (S), Analytical (A), or both (S&amp;A)</b>	<b>QC Sample or Activity</b>	<b>Frequency / Number</b>	<b>QC Acceptance Limits (Measurement Performance Criteria)</b>	<b>Corrective Action (CA)</b>	<b>Person(s) Responsible for CA</b>
Accuracy	A	Quantitation	Every sample	RL $\leq$ results $\leq$ upper calibration range on a sample-specific basis; IS must be used; and average response factors or curve-statistics generated from the ICAL must be used for quantitation. Results reported between the MDL and RL qualified "J"	Perform dilution to bring analyte within linear range, qualify data	Analyst/Data Reviewer
Sensitivity	A	Reporting of Non-Detects	Every sample	Reported at the sample-specific RL which must be $\leq$ PRL	Potential data usability issue	Data Reviewer
Overall Precision & Representativeness	S & A	Field Duplicate Samples [Site-specific QC]	1 per 20 field samples	RPD $\leq$ 30% for waters or RPD $\leq$ 50% for solids w/results $> 2x$ RL; Professional judgment for results $< 2x$ RL	Potential data usability issue	Data Reviewer
Accuracy (preservation)	S	Temperature Blank or other Cooler Temperature Reading	1 Temperature reading per cooler to be recorded upon receipt at lab	$\leq 6^{\circ}$ C; allow for $< 2^{\circ}$ C if samples intact sample preservation per SW-846 Chapter 4 Table 4-1	Potential data usability issue	Data Reviewer
Accuracy/ Sensitivity	S & A	Holding Time (HT)	Every field sample	Aqueous samples extracted within 7 days of collection; extract analyzed within 40 days of extraction. Soil/Sediment samples extracted within 14 days of collection; extract analyzed within 40 days of extraction. If Soil/Sediment samples are frozen, HT arrested and extraction HT continues when thawed. Solid samples can be maintained frozen for 1 year from collection.	Potential data usability issue	Data Reviewer

**Table 6 QAPP Worksheet All Matrices – - SVOAs by USEPA SW-846 8270C  
Measurement Performance Criteria & QC Samples**

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy/ Sensitivity	S	Equipment Blank [Site-specific QC]	Not Required if using dedicated sampling equipment. If performing decontamination of equipment, collect 1 EB per 20 field samples collected by the same method	Target analytes < RL	Potential data usability issue	Data Reviewer
Data Completeness	S & A	Calculate from valid/usable data collected	Not applicable	≥ 90% Overall	Potential data usability / data gap issue	Data Reviewer/ Investigator
Comparability	S & A	Based on Method (SOP) and QAPP/FSP protocols	Not applicable	Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples.	Potential data usability issue	Data Reviewer/ Investigator

**NOTES:**

1. This table was prepared by NJDEP, January 2011 to be compliant with EPA Region 2 guidance and meet the data quality needs of the Department.
2. Semivolatile Organic Compound analyses via USEPA SW-846 Method 8270D (*Quality Assurance and Quality Control Requirements for SW- 846 Method 8270D Semivolatile Organic Compounds by Gas Chromatography/Mass Spectroscopy [GC/MS]*). 8270D:

\*\*

Potentially “difficult” analytes include: benzenethiol, benzoic Acid, 2,4-dinitrophenol, 3&4 – methylphenol, 4-nitrophenol, pentachlorophenol, phenol, aniline, aramite, A,A-dimethylphenethylamine, benzidine, benzaldehyde, benzyl Alcohol, caprolactam, chlorobenzilate, 3,3'- Dimethylbenzidine, 1,4-Dioxane, 7,12-Dimethylbenz(a)anthracene, Diallate, Dibenz(a,j)acridine, Diphenylamine, Disulfoton, p- (dimethylamine)azobenzene, decane, famphur, hexachlorocyclopentadiene, hexachloroethane, hexachlorophene, hexachloropropene, kepone, 4,4'-methylenebis(2-chloroaniline), methapyrilene, methyl methanesulfonate, methyl parathion, n-nitrosodimethylamine, 4-nitroquinoline-1-oxide, 2-Picoline, parathion, pentachloroethane, pentachlorobenzene, pentachloronitrobenzene, phorate, pronamide, pyridine, p-phenylenediamine, o- tricresyl phosphate and Tetraethyl. Please note that many of the surrogates may fall outside of the 15 – 110% range 2-Fluorophenol, Phenol-d5, 2,4,6-tribromophenol and terphenyl-d14.

**Table 7 QAPP Worksheet All Matrices – - SVOAs by USEPA SW-846 8270D Measurement Performance Criteria & QC Samples**

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	DFTPP Tune	Every 12 hours	Method tune criteria based on criteria in Table 3 of USEPA-SW846 Method 8270D	Perform instrument maintenance; reanalyze until acceptable	Analyst
Accuracy	A	Initial Calibration (ICAL)	Initially and when CCAL fails	Minimum 5-standards; must contain all targets and lowest standard $\leq$ RL; <i>Full Scan</i> : RF see Table 4 for minimum RF; %RSD $\leq$ 20% for all compounds or "r" $\geq$ 0.99; <i>SIM</i> : %RSD $\leq$ 20% or "r" $\geq$ 0.99 for all compounds	Recalibrate as required by method; analysis cannot proceed without a valid initial calibration	Analyst
Accuracy/ Sensitivity	A	Method Blank	1 per extraction batch of up to 20 field samples	Must be matrix matched; Phthalates < 5xRL; All other Targets < RL, surrogates in criteria	Reanalyze and, if necessary, re-extract. Report non-conformance in narrative; compounds present in blank should be flagged "B" in samples, if detected.	Analyst
Accuracy	A	Matrix Spike/ Matrix Spike Duplicate [Site-specific QC]	1 per $\leq$ 20 field per matrix samples	Must contain all target analytes, performed on Site field sample, % recovery 70-130% except for difficult analytes** which must exhibit % recovery between 20-160%	Evaluate LCS, unspiked sample, reanalyze, if necessary, and qualify data and Narrate issue	Analyst/Data Reviewer

**Table 7 QAPP Worksheet All Matrices – - SVOAs by USEPA SW-846 8270D**  
**Measurement Performance Criteria & QC Samples**

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Precision	A	Matrix Spike/ Matrix Spike Duplicate [Site-specific QC]	1 per $\leq 20$ field per matrix samples	Must contain all target analytes, performed on Site field sample, % recovery criteria same as MS. RPDs $\leq 20\%$ for waters and $\leq 30\%$ for solids	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Accuracy	A	Laboratory Control Sample (LCS)	1 per extraction batch of up to 20 samples	Must contain all target analytes, be matrix-matched; % Recovery 70- 130% except for difficult analytes ** must exhibit percent recoveries between 20-160%.	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Precision	A	Sample Duplicate (DUP)	1 per $< 20$ field samples if an MS/MSD was not performed	Must be performed on a Site field sample. RPD $\leq 20\%$ for waters and $\leq 30\%$ for solids for results $> 2x$ RL	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Accuracy	A	Surrogates	Every sample including QC	Minimum of 3 base-neutral and 3 acid surrogates at RTs across GC run; for solids Matrices must be between 30-130% for all compounds; for water matrices 30-130% for BN surrogates and 15-110% for acid surrogates	Reanalyze, if necessary, qualify data	Analyst/Data Reviewer
Accuracy	A	Internal Standards (IS)	6 per sample including QC	Minimum of 6 IS, Areas 50-200% of the most recent t CCV standard; RTs $\pm 30$ sec. from midpoint ICAL standard	Reanalyze and qualify data	Analyst/Data Reviewer

**Table 7 QAPP Worksheet All Matrices – - SVOAs by USEPA SW-846 8270D**  
**Measurement Performance Criteria & QC Samples**

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Continuing Calibration Verification (CCV)	1 every 12 hour prior to analysis of samples	Concentration level near mid-point of ICAL curve containing all target compounds; <i>Full Scan</i> : %D or %Drift $\leq 20\%$ for CCCs and $\leq 30\%$ for all other compounds; <i>SIM</i> : %D or %Drift $\leq 30\%$	Recalibrate as required by method; note outliers in narrative.	Analyst
Accuracy	A	Quantitation	Every sample	RL $\leq$ results $\leq$ upper calibration range on a sample-specific basis; IS must be used; and RL $\leq$ results $\leq$ upper calibration range on a sample-specific basis; IS must be used; and average response factors or curve-statistics generated from the ICAL must be used for quantitation. Results reported between the MDL and RL qualified "J"	Perform dilution to bring analyte within linear range, qualify data	Analyst/Data Reviewer
Sensitivity	A	Reporting of Non-Detects	Every sample	Reported at the sample-specific RL which must be $\leq$ PRL	Potential data usability issue	Data Reviewer
Overall Precision & Representativeness	S & A	Field Duplicate Samples [Site-specific QC]	1 per 20 field samples	RPD $\leq 30\%$ for waters or RPD $\leq 50\%$ for solids w/results $> 2x$ RL; Professional judgment for results $< 2x$ RL	Potential data usability issue	Data Reviewer
Accuracy (preservation)	S	Temperature Blank or other Cooler Temperature Reading	1 Temperature reading per cooler to be recorded upon receipt at lab	$\leq 6^{\circ}$ C; allow for $< 2^{\circ}$ C if samples intact sample preservation per SW-846 Chapter 4 Table 4-1	Potential data usability issue	Data Reviewer

**Table 7 QAPP Worksheet All Matrices – - SVOAs by USEPA SW-846 8270D**  
**Measurement Performance Criteria & QC Samples**

<b>Data Quality Indicator (DQI)</b>	<b>QC Measure for Sampling (S), Analytical (A), or both (S&amp;A)</b>	<b>QC Sample or Activity</b>	<b>Frequency / Number</b>	<b>QC Acceptance Limits (Measurement Performance Criteria)</b>	<b>Corrective Action (CA)</b>	<b>Person(s) Responsible for CA</b>
Accuracy/ Sensitivity	S & A	Holding Time (HT)	Every field sample	Aqueous samples extracted within 7 days of collection; extract analyzed within 40 days of extraction. Soil/Sediment samples extracted within 14 days of collection; extract analyzed within 40 days of extraction. If Soil/Sediment samples are frozen, HT arrested and extraction HT continues when thawed. Solid samples can be maintained frozen for 1 year from collection.	Potential data usability issue	Data Reviewer
Accuracy/ Sensitivity	S	Equipment Blank [Site-specific QC]	Not Required if using dedicated sampling equipment. If performing decontamination of equipment, collect 1 EB per 20 field samples collected by the same method	Target analytes < RL	Potential data usability issue	Data Reviewer
Data Completeness	S & A	Calculate from valid/usable data collected	Not applicable	≥ 90% Overall	Potential data usability / data gap issue	Data Reviewer/ Investigator
Comparability	S & A	Based on Method (SOP) and QAPP/FSP protocols	Not applicable	Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples.	Potential data usability issue	Data Reviewer/ Investigator

**NOTES:**

1. This table was prepared by NJDEP, January 2011 to be compliant with EPA Region 2 guidance and meet the data quality needs of the Department.
2. Semivolatile Organic Compound analyses via USEPA SW-846 Method 8270D (*Quality Assurance and Quality Control Requirements for SW-846 Method 8270D Semivolatile Organic Compounds by Gas Chromatography/Mass Spectroscopy [GC/MS]*). 8270D:

\*\* Potentially “difficult” analytes include: Benzenethiol, Benzoic Acid, 2,4-Dinitrophenol, 3,4-Dimethylphenol, 4-Nitrophenol, Pentachlorophenol, Phenol, Aniline, Aramite, A,A-Dimethylphenethylamine, Benzidine, Benzaldehyde, Benzyl Alcohol, Caprolactam, Chlorobenzilate, 3,3'-Dimethylbenzidine, 1,4-Dioxane, 7,12-Dimethylbenz(a)anthracene, Diallylamine, Dibenz(a,h)acridine, Diphenylamine, Disulfoton, p-(dimethylamine)azobenzene, Decane, Dieldrin, Hexachlorocyclopentadiene, Hexachloroethane, Hexachlorophene, Hexachloropropene, Kepone, 4,4'-methylenebis(2-chloroaniline), Methapyrilene, Methyl methanesulfonate, Methyl parathion, n-Nitrosodimethylamine, 4-Nitroquinoline-1-oxide, 2-Picoline, Parathion, Pentachloroethane, Pentachlorobenzene, Pentachloronitrobenzene, Phorate, Pronamide, Pyridine, p-Phenylenediamine, o-tricresyl phosphate and Tetraethyl. Please note that many of the surrogates fall outside or the 15 – 110% range 2-Fluorophenol, Phenol-d5, 2,4, 6-Tribromophenol and Terphenyl-d14.

**ATTACHMENT 2:**  
**Reporting List and Project Quantitation Limits**

VOC's-8260 (mg/kg)	Cas No.	ER-L	ER-M	MDL	Laboratory PQL
Acetone	67-64-1	--	--	0.006	0.02
Benzene	71-43-2	0.34	--	0.0005	0.005
Bromochloromethane	74-97-5	--	--	0.0006	0.005
Bromodichloromethane	75-27-4	--	--	0.0004	0.005
Bromoform	75-25-2	--	--	0.005	0.01
Bromomethane	74-83-9	--	--	0.0007	0.005
2-Butanone (MEK)	78-93-3	--	--	0.001	0.01
Carbon Disulfide	75-15-0	--	--	0.0006	0.005
Carbon tetrachloride	56-23-5	--	--	0.0005	0.005
Chlorobenzene	108-90-7	--	--	0.0005	0.005
Chloroethane	75-00-3	--	--	0.001	0.005
Chloroform	67-66-3	--	--	0.0006	0.005
Chloromethane	74-87-3	--	--	0.0006	0.005
cis-1,2-Dichloroethene	156-59-2	--	--	0.0005	0.005
cis-1,3-Dichloropropene	10061-01-5	--	--	0.0004	0.005
Cyclohexane	110-82-7	--	--	0.0005	0.005
1,2-Dibromo-3-chloropropane	96-12-8	--	--	0.0004	0.005
Dibromochloromethane	124-48-1	--	--	0.0004	0.005
1,2-Dibromoethane	106-93-4	--	--	0.0004	0.005
1,2-Dichlorobenzene	95-50-1	--	0.013	0.0005	0.005
1,3-Dichlorobenzene	541-73-1	--	--	0.0005	0.005
1,4-Dichlorobenzene	106-46-7	--	0.11	0.0004	0.005
Dichlorodifluoromethane	75-71-8	--	--	0.0006	0.005
1,1-Dichloroethane	75-34-3	--	--	0.0005	0.005
1,2-Dichloroethane	107-06-2	--	--	0.0006	0.005
1,1-Dichloroethene	75-35-4	--	--	0.0005	0.005
1,2-Dichloropropane	78-87-5	--	--	0.0005	0.005
1,3-Dichloropropene (total)	542-75-6	--	--	N/A	0.005
Ethylbenzene	100-41-4	1.4	--	0.0004	0.005
2-Hexanone	591-78-6	--	--	0.001	0.01
Isopropylbenzene	98-82-8	--	--	0.0004	0.005
Methyl Acetate	79-20-9	--	--	0.001	0.005
Methyl Tert Butyl Ether (MTBE)	1634-04-4	--	--	0.0005	0.005
4-methyl-2-pentanone (MIBK)	108-10-1	--	--	0.001	0.01
Methylcyclohexane	108-87-2	--	--	0.0006	0.005
Methylene chloride	75-09-2	--	--	0.002	0.005
Styrene	100-42-5	--	--	0.0003	0.005
1,1,2,2-Tetrachloroethane	79-34-5	--	--	0.0004	0.005
Tetrachloroethene	127-18-4	0.45	--	0.0005	0.005
Toluene	108-88-3	2.5	--	0.0006	0.005

trans-1,2-Dichloroethene	156-60-5	--	--	0.0005	0.005
trans-1,3-Dichloropropene	10061-02-6	--	--	0.0003	0.005
Freon 113	76-13-1	--	--	0.0006	0.01
1,2,3-Trichlorobenzene	87-61-6	--	--	0.005	0.01
1,1,1-Trichloroethane	71-55-6	--	--	0.0006	0.005
1,1,2-Trichloroethane	79-00-5	--	--	0.0005	0.005
Trichloroethene	79-01-6	1.6	--	0.0005	0.005
Trichlorofluoromethane	75-69-4	--	--	0.0007	0.005
1,2,4-Trichlorobenzene	120-82-1	--	0.0048	0.005	0.01
Vinyl Chloride	75-01-4	--	--	0.0006	0.005
m,p-Xylene	179601-23-1	--	--	N/A	N/A
o-Xylene	95-47-6	--	--	0.0004	0.005
Xylenes (total)	1330-20-7	0.12	--	0.001	0.005

<b>SVOC's-8270/8270SIM (mg/kg)</b>	<b>Cas No.</b>	<b>ER-L</b>	<b>ER-M</b>	<b>MDL</b>	<b>Laboratory PQL</b>
Acenaphthene	83-32-9	0.016	0.5	0.003	0.017
Acenaphthylene	208-96-8	0.044	0.64	0.003	0.017
Acetophenone	98-86-2	--	--	0.023	0.05
Anthracene	120-12-7	0.085	1.1	0.003	0.017
Atrazine	1912-24-9	--	--	0.033	0.17
Benzaldehyde	100-52-7	--	--	0.067	0.17
Benzo(a)pyrene	50-32-8	0.43	1.6	0.007	0.017
Benzo(a)anthracene	56-55-3	0.261	1.6	0.003	0.017
Benzo(b)fluoranthene	205-99-2	--	1.8	0.003	0.017
Benzo(ghi)perylene	191-24-2	0.17	--	0.007	0.017
Benzo(k)fluoranthene	207-08-9	0.24	--	0.003	0.017
BHC (Benzohexachloride)	608-73-1	0.003	--	N/A	N/A
1,1-Biphenyl	92-52-4	--	--	0.017	0.037
bis(2-Chloroethoxy)methane	111-91-1	--	--	0.017	0.037
bis(2-Chloroethyl)ether	111-44-4	--	--	0.023	0.05
bis(2-Chloroisopropyl)ether	108-60-1	--	--	0.017	0.037
bis(2-Ethylhexyl)phthalate	117-81-7	0.18216	2.64651	0.067	0.17
4-Bromophenyl-phenylether	101-55-3	--	--	0.02	0.05
Butyl benzyl phthalate	85-68-7	--	0.063	0.067	0.17
Caprolactam	105-60-2	--	--	0.033	0.17
Carbazole	86-74-8	--	--	0.017	0.037
2-Chloronaphthalene	91-58-7	--	--	0.007	0.033
2-Chlorophenol	95-57-8	--	0.008	0.017	0.037
4-Chlorophenyl-phenylether	7005-72-3	--	--	0.017	0.037
Chrysene	218-01-9	0.384	2.8	0.003	0.017
Dibenz(a,h)anthracene	53-70-3	0.063	0.26	0.003	0.017

Dibenzofuran	132-64-9	--	--	0.017	0.037
3,3'-Dichlorobenzidine	91-94-1	--	--	0.1	0.33
2,4-Dichlorophenol	120-83-2	--	0.005	0.017	0.037
Diethyl phthalate	84-66-2	--	0.006	0.067	0.17
2,4-Dimethyl phenol	105-67-9	--	--	0.017	0.037
Dimethyl phthalate	131-11-3	--	--	0.067	0.17
Di-n-butyl phthalate	84-74-2	--	0.058	0.067	0.17
4,6-Dinitro-2-methylphenol	534-52-1	--	--	0.17	0.5
2,4-Dinitrophenol	51-28-5	--	--	0.37	1
Dinitrotoluene (2,4-2,6-mixture)	25321-14-6	--	--	N/A	0.2
2,4-Dinitrotoluene	121-14-2	--	--	0.067	0.17
2,6-Dinitrotoluene	606-20-2	--	--	0.02	0.05
Di-n-octyl phthalate	117-84-0	--	--	0.067	0.17
1,4-Dioxane	123-91-1	--	--	0.1	0.33
Fluoranthene	206-44-0	0.6	5.1	0.003	0.017
Fluorene	86-73-7	0.019	0.54	0.003	0.017
Hexachlorobenzene	118-74-1	0.02	--	0.003	0.017
Hexachlorobutadiene	87-68-3	--	0.0013	0.02	0.05
Hexachlorocyclopentadiene	77-47-4	--	--	0.17	0.5
Hexachloroethane	67-72-1	--	0.073	0.033	0.17
Indeno(1,2,3-cd)pyrene	193-39-5	0.2	--	0.007	0.017
Isophorone	78-59-1	--	--	0.017	0.037
2-Methylnaphthalene	91-57-6	0.07	0.67	0.01	0.033
2-Methylphenol	95-48-7	--	--	0.027	0.067
3&4-Methylphenol	65794-96-9	--	--	0.02	0.05
Naphthalene	91-20-3	0.16	2.1	0.007	0.017
2-Nitroaniline	88-74-4	--	--	0.02	0.05
3-Nitroaniline	99-09-2	--	--	0.067	0.17
4-Nitroaniline	100-01-6	--	--	0.067	0.17
Nitrobenzene	98-95-3	--	--	N/A	0.2
2-Nitrophenol	88-75-5	--	--	0.017	0.037
4-Nitrophenol	100-02-7	--	--	0.17	0.5
n-Nitrosodi-n-propylamine	621-64-7	--	--	0.02	0.05
n-Nitrosodiphenylamine	86-30-6	--	--	0.017	0.037
p-Chloroaniline	106-47-8	--	--	0.033	0.17
p-Chloro-m-cresol	59-50-7	--	--	0.017	0.037
Pentachlorophenol	87-86-5	--	0.017	0.037	0.17
Phenanthrene	85-01-8	0.24	1.5	0.003	0.017
Phenol	108-95-2	--	0.13	0.023	0.05
Pyrene	129-00-0	0.665	2.6	0.003	0.017
1,2,4,5-Tetrachlorobenzene	95-94-3	--	--	0.017	0.037
2,3,4,6-Tetrachlorophenol	58-90-2	--	--	0.067	0.17

2,4,5-Trichlorophenol	95-95-4	--	0.003	0.02	0.05
2,4,6-Trichlorophenol	88-06-2	--	0.006	0.02	0.05

<b>Metals-6010C/7471 (mg/kg)</b>	<b>Cas No.</b>	<b>ER-L</b>	<b>ER-M</b>	<b>MDL</b>	<b>Laboratory PQL</b>
Aluminum	7429-90-5	--	18000	11.8	60.0
Antimony	7440-36-0	--	9.3	1.70	10.0
Arsenic	7440-38-2	8.2	70	1.20	10.0
Barium	7440-39-3	--	48	0.150	1.00
Beryllium	7440-41-7	--	--	0.100	1.00
Cadmium	7440-43-9	1.2	9.6	0.100	1.00
Calcium	7440-70-2	--	--	24.3	100
Chromium	7440-47-3	81	370	0.210	3.00
Cobalt	7440-48-4	--	10	0.146	1.00
Copper	7440-50-8	34	270	0.500	4.00
Cyanide	57-12-5	--	--	0.18	0.50
Iron	7439-89-6	--	--	5.00	40.0
Lead	7439-92-1	47	218	0.600	3.00
Magnesium	7439-95-4	--	--	1.67	20.0
Manganese	7439-96-5	--	260	0.900	4.00
Mercury	7439-97-6	0.15	0.71	0.187	0.800
Nickel	7440-02-0	--	52	0.210	2.00
Potassium	7440-09-7	--	--	19.8	100.0
Selenium	7782-49-2	--	1	1.50	10.0
Silver	7440-22-4	1	3.7	0.400	2.00
Sodium	7440-23-5	--	--	46.2	200
Thallium	7440-28-0	--	--	0.897	6.00
Vanadium	7440-62-2	--	57	0.200	2.00
Zinc	7440-66-6	150	410	0.400	4.00

## APPENDIX B

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## **APPENDIX B:**

### **Electronic Copy of Supplemental Field Sampling and Analysis Plan**

## ATTACHMENT 2

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**ATTACHMENT 2**

**August 31, 2018 EPA/NJDEP Letter Regarding  
Former Chevron Perth Amboy Facility  
Water Body Sediment Sampling**



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 2  
290 BROADWAY  
NEW YORK, NY 10007-1866

**AUG 31 2018**

Robert Mancini  
Project Manager, Refining Business Unit  
Chevron Environmental Management Company  
1200 State Street  
Perth Amboy, New Jersey 08861

Re: Chevron Waterbody Sediment Sampling  
Former Chevron Perth Amboy Facility  
Perth Amboy, Middlesex County, New Jersey  
EPA ID #: NJD081982902

Dear Mr. Mancini:

The U.S. Environmental Protection Agency (EPA) Region 2 and the New Jersey Department of Environmental Protection (NJDEP) have drafted comments regarding Chevron's upcoming waterbody sediment sampling. Chevron previously sampled Woodbridge Creek, Spa Spring Creek, and the Arthur Kill for VOCs, SVOCs, EPH, PCB, Metals, and Pesticides in 2002 and 2014. However, based on a review of data collected from the 2 sampling periods, EPA and NJDEP have determined that the three waterbodies sediment, associated with the Former Chevron Perth Amboy Refinery, must be further investigated (i.e., additional sampling must be performed) pursuant to N.J.A.C. 7:26E-2.1(a)14; 2.1(d); 3.6, 4.8, 4.9, 5.1 (e), et al., and NJDEP's *Ecological Evaluation Technical Guidance* (EETG), February 2015. The goal of the additional investigation is to complete a comprehensive RCRA Facility Investigation (RFI) of these waterbodies and thus fulfill the requirements set forth by the 2013 EPA HSWA Permit renewal.

Additional sampling is needed to complete delineation of product and other contaminants along all the waterbodies. Enclosed are EPA and NJDEP comments for the upcoming sediment sampling. To meet these sampling objectives, a Field Sampling and Analysis Plan (FSAP) must be designed to characterize and delineate site-related free and residual petroleum product and other site-related contaminants, such that the lateral and vertical extent of contamination are well defined to determine the approximate volume of contamination in these water bodies.

Should you have any questions or would like to discuss this matter further, I can be reached at 212-637-3703, or via email at [vargas.ricardito@epa.gov](mailto:vargas.ricardito@epa.gov).

Sincerely,

A handwritten signature in cursive script that reads "Ricardito Vargas".

Ricardito Vargas  
Project Manager  
Hazardous Waste Programs Branch

Enclosure

APPENDIX A

**Chevron/Buckeye, Perth Amboy, NJ**  
**EPA and NJDEP Recommendations/Comments for 2018 Sediment Sampling**  
**September 2018**

**General Comments**

1. Historic aerial photographs and existing sediment data suggest there are elevated levels of petroleum product and contaminants at historic outfall/discharge areas located near transect 3 (oil/water separator, SMU 40) and transect 2 (former tidal creek) in Woodbridge Creek. Chevron should identify all other historic contaminant migration pathways into Woodbridge Creek, Spa Spring Creek, and the Arthur Kill, including direct or indirect discharge of untreated or treated industrial process waste. The specific contaminants, mass estimates, and timeframe/duration of the discharge should be provided.
2. Chevron submitted an updated data sheet to EPA on June 29, 2018. EPA and NJDEP are requesting that the facility no longer report data as "ND" or Non-Detect. Chevron needs to report the actual results, which can be followed by a "U" in parentheses to indicate that the results are less than the Method Detection Limit (MDL). EPA and NJDEP request an updated data table to reflect this comment.

**Specific Comments**

**Woodbridge Creek**

1. Background Samples: EPA and NJDEP do not accept SED-09 as an appropriate background location. This transect contains EPH, among other contaminants, and thus cannot be considered as background. SED-10 does look like an area that can potentially be used as background. Chevron needs to re-sample this transect for all contaminants and product. EPA and NJDEP also believe that 3 sample points along the transect may not be sufficient to determine background concentrations. Thus, EPA and NJDEP are requesting Chevron to use USEPA's ProUCL method, including the successive removal of statistical outliers, to determine background using a minimum of 8 samples.
2. EPA is requiring an additional transect to sample for all contaminants (VOCs, SVOCs, EPH, PCB, Metals, Organochlorine Pesticides, TOC, and particle grain size) at the midpoint between SED -09 and SED-06. The transect should contain 3 points (A-C), with C being closest to the facility, B the midpoint, and A located on the opposite side of the facility. If results show hotspots, Chevron must delineate by adding additional transects 200 feet from the hotspot in the upstream and downstream direction.
3. SED-06 – SED-03
  - a. Resample transect for all parameters for all points and at consistent depths (surface and sub-surface)
  - b. Add 2 additional points (A' and C') to extend the transect to the facility property and the Northfield property/Southern Parcels. These additional points need to be sampled for the full suite of parameters
4. EPA is requiring an additional transect to sample for all contaminants (VOCs, SVOCs, EPH, PCB, Metals, Pesticides, Herbicides) at the midpoint between SED -03 and SED-02 and midway between SED-02 and SED-01. The transects should contain 3 points (A-C), with C being closest to the facility, B the midpoint, and A located on the opposite side of the facility. If results show

hotspots, Chevron must delineate by adding additional transects 200 feet from the hotspot, both upstream and downstream.

5. SED-02: Resample transect for all parameters for all points and at consistent depths (surface and sub-surface)
6. SED-01: Resample transect for all parameters for all points and at consistent depths (surface and sub-surface)
7. SED -19:
  - a. Add additional point (A) along transect and sample for full suite of parameters
  - b. Resample transects for all parameters for all points and at consistent depths (surface and subsurface)
8. Other transects should be added as needed to investigate/delineate discharge areas identified as per General Comment 1 above.
9. A transect is needed between the former Chevron Refinery Site and DITSED-08. Please explain whether horizontal and vertical delineation is complete in the DITSED-8 area.
10. Chevron should clarify if there were any impacts or sediment removal activities implemented as a result of the engineered wetlands between transect 6 and 8 along Woodbridge Creek and Spa Spring Creek.

#### **Spa Spring Creek**

1. Background Sample: Chevron needs to establish an appropriate background location and apply the ProUCL method with a minimum of 8 samples.
2. EPA requires additional sampling at all former transects and points for sub-surface sediment.
3. Additional discrete samples or transects should be added as needed to investigate/delineate discharge areas identified as per General Comment 1 above.
4. Clarify the location of the former NJPDES discharge point on Spa Spring Creek relative to existing sample locations, how long this discharge point was in use, and what are the permit discharge limits.

#### **Arthur Kill**

1. EPA is requiring additional sub-surface sampling along all former sampling points for all parameters.
2. Additional discrete samples or transects should be added as needed to investigate/delineate discharge areas identified as per General Comment 1 above.
3. EPA is requesting additional information on the dates/location of dredging in the Arthur Kill.

## ATTACHMENT 3

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### **ATTACHMENT 3**

**Excerpt from 1994 Description of Current Conditions**

The 1991 Closure Plan revisions proposed mechanical dewatering, thermal separation, and recycling of the sludge and soils from the North Field Basin, East Yard Basin, and the Surge Pond as the primary remedial method. No change in technology (bioremediation) was proposed for closure of the landfarm.

The October 1991 "Surface Impoundments and Landfarm Closure Plan" was approved by the NJDEP. The approval for this document was issued in the form of a NJPDES Discharge to Groundwater Permit. This permit, NJPDES-DGW NJ0080390, incorporates the proposals for closure in the above referenced documents and is the regulatory mechanism for implementing closure. This permit is further discussed in Section 2.5.1.4.

#### **2.5.1.3 New Jersey Pollutant Discharge Elimination System (NJPDES) Discharge to Surface Water (DSW) Permits**

NJPDES permit No. NJ0000221 allows the discharge of Refinery process and stormwater to be discharged to surface waters, which include Spa Spring Creek and Woodbridge Creek. Chevron has three main discharge points regulated under the current version of this permit: 004, 005, and 006.

Discharge point discharge serial number (DSN) 004 initially consisted of power plant water softener regeneration water and storm water runoff from non-process areas of Chevron, as well as from property owned by others and from public roads. This single terminal discharge point, renamed DSN 004A, is now monitored by two upstream monitoring points, identified as DSN 004B and DSN 004C. The purpose of these two monitor points is to accurately monitor Chevron's contributions to the Spa Spring Creek outfall by assessing Chevron's contribution to outfall DSN 004A before they are mixed with off-site sources. Since the Power Plant has been decommissioned and no longer contributes its wastewater stream, the Refinery has requested that the monitoring of discharge point DSN 004B be eliminated.

Discharge point No. 005 consists of process water and contaminated stormwater runoff that is treated using the Refinery ETP, a biological waste water treatment facility. The ETP utilizes API separator, IAF units, an equalization basin, biodisks, clarifiers, and a Post-Aeration Basin prior to discharge into Woodbridge Creek.

Discharge to point No. 006 reflects stormwater runoff from the undeveloped portions of Amboy Field to the Amboy Ditch. Discharge point 006 was added to the original permit as a modification in October 1992.

The following is a historical breakdown of the NJPDES Permit No. NJ0000221 issuances with key information:

**June 1974 to Approximately 1979** -- Available records indicate that the Refinery was operating under an National Pollutant Discharge Elimination (NPDES) DSW permit during this period. The NJDEP was not the implementing agency at this time. No relevant information for this period is currently available. Archived records may contain additional information, if required.

**July 3, 1979 to Approximately 1984** -- Available records for this permit describe only discharge point 004, described as effluent from power plant to Spa Spring Creek. It is likely that the ETP discharge was also covered by this permit. Although these permits are generally issued for five year periods it appears that they have remained in effect past their expiration until successful negotiation of the new permit.

**Units Covered**

DSN 004 -- Power Plant - non-contact cooling water from turbo generator condenser.

**Significant Changes from Previous Issuance** -- No copies of an earlier permit were located, however it appears from this permit that this discharge point has been regulated since 6/14/74.

**Parameters Monitored** -- Flow, Ph, Temperature (winter and summer), Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Total Suspended Solids (TSS), Specific Conductance, Settleable Matter, Total Organic Carbon (TOC), and Oil and Grease.

**Discharge Point(s) Used**

DSN 004: Ditch to Spa Spring Creek to Woodbridge Creek.

**Monitoring Events** -- Flow and Temperature were reportedly continuously monitored. TOC, Oil and Grease, and pH bimonthly. No indication was given regarding the frequency of sampling for the remaining analytes.

**January 25, 1985 to approximately 1990** -- Allowed the discharge of process and storm water to be discharged to surface waters from an industrial commercial facility. Permit transferred from the previous federal jurisdiction to the NJDEP.

**Units Covered/Discharge Points Monitored** -- Two discharge points were covered by this permit: DSN 004 and DSN 005.

DSN No. 004 - Spa Spring Creek- covers power plant water softener regeneration water and stormwater runoff from non-process areas of Chevron, as well as from property owned by others and from public roads.

DSN No. 005 - Woodbridge Creek - covers process water and contaminated stormwater runoff that is treated by an Effluent Treatment Plant (ETP) using mechanical and biological methods. The ETP utilizes an API separator, LAF units, equalization, biodisks, clarifiers, and Post-Aeration Basin prior to discharge into Woodbridge Creek.

**Significant Changes from Previous Issuance --** Significant changes in this permit include the change of jurisdiction and the definite inclusion of DSN 005, located at the outfall of the ETP.

**Parameters Monitored --**

DSN 004 - Flow (MGD), COD, BOD, TSS, Fecal Coliforms, Total Chlorine Residual, Temperature, pH, Petroleum Hydrocarbons, Oil and Grease, Floating Solids, Foam

DSN 005 - Flow (MGD), COD, BOD, TSS, Fecal Coliforms, Total Residual Chlorine, Temp, pH, Petroleum Hydrocarbons, Oil and Grease, Ammonia, Sulfide, Chromium (total and Hexavalent) Floating Solids, Foam TSS, 96 Hr. acute mycid bioassay

**Monitoring Events --** In accordance with permit requirements. Bioassay tests were conducted quarterly, other parameters were required monthly.

**October 1992 Modification --** This modification reflects the stormwater runoff from undeveloped portions of Amboy Field to the unpermitted discharge point entering a ditch along Amboy Avenue identified in NJDEP correspondence. The NJDEP issued the Refinery an NOV for an "unpermitted discharge to surface water ditch on Amboy Road" on September 16, 1992. The NJDEP described remedial action consisting of, "apply for permit modification for existing NJPDES permit to include ditch or seek general stormwater permit for the discharge."

**Units Covered --** Discharge to point No. 006 reflects stormwater runoff from the Amboy field to the Amboy Ditch. Discharge point 006 was added to the original permit as a modification in October 1992. Average flow estimated to be 50 gallons per minute.

According to a file memorandum "no limits will be placed on the parameters being monitored. Once enough data has been collected to demonstrate that the water in the ditch is harmless sampling may be discontinued."

**August 1, 1993 to July 31, 1998 --** On June 25, 1993, NJDEP issued a Final NJPDES Discharge to Surface Water Permit Reissuance, which became effective August 1, 1993. Revisions to the permit enable the Refinery to accurately monitor contributions to the Spa Spring Creek outfall, and to monitor discharges associated with the sludge dewatering operations.

**Units Covered/Discharge Points Monitored --**

DSN 004A, 004B, 004C - Spa Spring Creek Outfalls

DSN 005 - Effluent Treatment Plant

DSN 005A - Parshall Flume from WTP

DSN 006A - Runoff from undeveloped portion of Amboy Field to Amboy Ditch

**Significant Changes from Previous Issuance --** The single terminal discharge known as DSN 004, has been identified as DSN 004A, and two upstream monitoring points, identified as DSN 004B and DSN 004C have been added.

The final reissuance also incorporated several modifications to the draft permit, primarily with respect to the additional discharges from the ETP which would occur during the sludge dewatering phase of the surface impoundment closure activities.

**Parameters Monitored --**

DSN 004A - not monitored

DSN 004B and DSN 004C: flow (MGD), pH, TSS, Chloroform, COD, Total Lead, Petroleum Hydrocarbons, Thallium, Total Zinc

DSN 005 - Effluent Treatment Plant

DSN 005A - Flow (mgd), Temperature, BOD's, TSS, Oil and Grease, COD, Ammonia as N, Sulfide, Phenolic Compounds, Total Chromium, Hexavalent Chromium, pH, Total Recoverable Cadmium, Total Recoverable Nickel, Total Recoverable Arsenic, Total Recoverable Zinc, Chronic Toxicity

DSN 006A - COD, Flow, TSS, Total Petroleum Hydrocarbons, pH

**2.5.1.4 NJPDES - Discharge to Groundwater (DGW) Permits**

On January 7, 1993 Chevron received a final New Jersey Pollutant Discharge Elimination System - Discharge to Groundwater permit for the Refinery. This permit governs and is the mechanism for closure of three surface impoundments on the Refinery, the East Yard Basin, the North Field Basin, and the Surge Pond; and one land treatment facility, the Landfarm. This permit approves and incorporates by reference the October 1991 Surface Impoundments and Landfarm Closure Plan that was developed for these areas. Assessment of compliance is established through

## ATTACHMENT 4

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**ATTACHMENT 4**

**Settlement Agreement**

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UNITED STATES DISTRICT COURT  
DISTRICT OF NEW JERSEY

CHEVRON U.S.A. INC.,

Plaintiff,

v.

AMERICAN CYANAMID COMPANY,  
et al.,

Defendants.

Civil Action No. 97-1572 (DMC)

**SETTLEMENT**  
**AGREEMENT AND CONSENT ORDER**

This Settlement Agreement and Consent Order (the "Consent Order") is made by and between Chevron U.S.A. Inc. ("Chevron"), American Cyanamid Company ("American Cyanamid"), C.P. Chemicals, Inc. ("C.P."), Philipp Brothers Chemicals, Inc. (now known as Phibro Animal Health Corporation) ("PAHC"), Rhone-Poulenc, USA Inc. (now known as Bayer CropScience Inc.) ("Bayer"), Legacy Vulcan Corp. (formerly named Vulcan Materials Company) ("Legacy Vulcan"), Stolthaven Perth Amboy, and North Field Extension, LLC ("NFE, LLC") (individually, a "Party" and collectively, "Parties").

**WHEREAS**, Chevron owns property known as Block 729, Tax Lot 2, Block 732 A, Tax Lot 1 and Block 734 A, Tax Lot 1 located in Woodbridge Township, Middlesex County, New Jersey, also known as the North Field Extension (the "NFE"); and

**WHEREAS**, in 1994 the United States Environmental Protection Agency ("EPA") issued to Chevron a permit pursuant to the Hazardous and Solid Waste Amendments of 1984 to the Resource Conservation and Recovery Act ("HSWA"), specifically permit number

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NJD081982902 (the "HSWA Permit"), under which Chevron is obligated to undertake certain actions at the NFE; and

**WHEREAS**, Chevron filed litigation on March 26, 1997, against American Cyanamid, C.P., ICI American Holdings, Inc., Imperial Chemical Industries PLC, PAHC, Bayer, Stauffer Management Company, Legacy Vulcan (then named Vulcan Materials Company), Zeneca Group PLC, Zeneca Holdings Inc., Zeneca Inc. and ICI Americas, Inc. in the United States District Court for the District of New Jersey relating to investigation and remediation of contamination at the NFE; and

**WHEREAS**, on August 14, 1997, after notice to the EPA, Chevron filed an Amended Complaint (the "Amended Complaint") against the above-listed defendants; and

**WHEREAS**, on April 3, 1998, an Order was entered by consent of the parties dismissing without prejudice the following defendants from the action: Imperial Chemical Industries PLC, Zeneca Group PLC, Zeneca Holdings Inc., Zeneca Inc., ICI American Holdings Inc., ICI Americas Inc. and Stauffer Management Company; and

**WHEREAS**, on June 1, 1998, defendants C.P., PAHC, American Cyanamid and Legacy Vulcan (the "Third Party Plaintiffs") filed Third Party Complaints against Alumet Corporation ("Alumet"), Howmet Corporation ("Howmet"), Stolthaven Perth Amboy ("Stolthaven"), and Shell Oil Company and Shell Oil Products (collectively, "Shell"); and

**WHEREAS**, on September 14, 1998, the Third Party Plaintiffs filed Amended Third Party Complaints against Alumet, Howmet, Stolthaven and Shell; and

**WHEREAS**, on December 9, 1998, an Order was entered by consent of the Parties dismissing Howmet; and

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**WHEREAS**, in or about July 2002, the Parties and Alumet entered into a Settlement Agreement and Consent Order of Dismissal (the "2002 Settlement") to resolve the above-captioned matter (the "Litigation"); and

**WHEREAS**, in 2005 disputes arose amongst the Parties concerning the 2002 Settlement; and

**WHEREAS**, the Parties wish to and have agreed to resolve the Litigation as set forth in this Consent Order; and

**WHEREAS**, the Litigation was pending or settled on the date of the enactment of P.L. 2009, C.60, and concerned, *inter alia*, remediation pursuant to the Resource Conservation and Recovery Act, 42 U.S.C. § 6921 *et seq.* ("RCRA"); and

**WHEREAS**, the Parties agree that this Consent Order reflects the full and complete agreement amongst the Parties.

**NOW, THEREFORE**, for good and valuable consideration, the receipt of which is acknowledged, and intending to be legally bound hereby, without trial of any issues or any findings of fact or law, and without any admission by any Party, the Parties agree, and it is hereby ordered and decreed, as follows:

**1. Effect of Consent Order on 2002 Agreement.**

(a) Effective upon the execution of this Consent Order by all of the Parties and entry by the Court, except as set forth in Paragraphs 9(c), 10(a) and 10(b) herein, the Parties agree that this Consent Order represents the full and complete agreement amongst the Parties with respect to the Litigation. Effective upon execution of this Consent Order by all of the Parties and entry by the Court, except as set forth in Paragraphs 9(c), 10(a) and 10(b) herein, and

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except for the dismissal without prejudice of Shell Oil Company and Shell Oil Products, the 2002 Settlement is superseded by this Consent Order.

(b) Without limiting the effect of Paragraph 1(a) above, the Parties expressly acknowledge and agree that upon execution of this Consent Order by all of the Parties and entry by the Court, the Due Diligence Period and the Sampling Parties'<sup>1</sup> (hereinafter referred to as the "Acquiring Parties") right to opt out of the 2002 Settlement have expired.

**2. Conveyance of the Northern Parcels of the NFE.**

(a) Within thirty (30) days from the date of entry of this Consent Order by the Court, NFE, LLC and Chevron will execute a Contract for Sale of Real Estate (the "Contract of Sale") in the form attached hereto as Exhibit "A" for conveyance of Block 732.A, Tax Lot 1 and for Block 729, Tax Lot 2, as such lots are set forth on the Minor Subdivision Sketch Plat approved by the Township of Woodbridge on May 23, 2007 (collectively, the "Northern Parcels") to NFE, LLC attached as Attachment 1 of Exhibit A.

(b) Closing under the Contract of Sale (the "Closing") will occur as set forth in Paragraph 3(f) of this Consent Order.

(c) Under the Contract of Sale, Chevron will convey fee title to the Northern Parcels (subject to all easements, licenses, etc. for existing pipelines and/or rights-of-way identified in First American Title Insurance Company commitment to Insure Title No. ST01-33258 (the "Commitment") and as described in Paragraph 5 of Exhibit "A" to this Consent Order) by way of a quitclaim deed, with covenants against Grantor's acts, in the form attached as

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<sup>1</sup> The "Sampling Parties" identified in the 2002 Settlement are C.P., PAHC, and Legacy Vulcan.

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Attachment 6 to Exhibit A, to NFE, LLC, an entity established by the Acquiring Parties. Chevron shall retain easements over the Northern Parcels that will include access to its existing pipeline properties and to Block 734.A, Tax Lot 1 (the "Southern Parcel") as set forth in the Roadway Easement Agreement and Pipeline Easement Agreement the forms of which are attached as Attachments "3.A." and "3.B." of Exhibit "A" of this Consent Order. Chevron, the Acquiring Parties, and NFE, LLC (collectively, the "Primary Parties") shall deliver at the Closing the executed Access Agreement for Investigation and/or Remediation Work as provided for in Paragraph 5 of this Consent Order, in the form attached as Exhibit "B" of this Consent Order. NFE, LLC shall be authorized to fulfill all obligations described in this Consent Order with respect to the Acquiring Parties.

(d) For sixty (60) days from the date of entry of this Consent Order by the Court, the Acquiring Parties and NFE, LLC shall have the right, at their sole cost and expense, to obtain an updated title commitment (the "First Updated Commitment") and to notify Chevron of any exceptions, conditions or defects other than those contained in the Commitment ("New Exceptions") which New Exceptions Chevron shall cure prior to Closing. The Commitment is attached as Attachment 4 of Exhibit "A" to this Consent Order. At any time prior to Closing, the Acquiring Parties and NFE, LLC shall have the right, at their sole cost and expense, to obtain a second updated Commitment (the "Second Updated Commitment") to identify any additional exceptions, conditions or defects that may have arisen after the First Updated Commitment ("Additional Exceptions"), which Additional Exceptions Chevron shall cure, provided that, at Chevron's option, Closing will not be delayed if title insurance will cover the Additional Exceptions raised by the Second Updated Commitment and Chevron agrees to pay any incremental cost associated with causing title insurance to provide such coverage. Chevron's

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obligation to cure under this Paragraph 2(d) shall survive the Closing, to the extent not satisfied prior to Closing, and the removal of the exception, condition or defect may be accomplished by challenge, payment or other cure.

(e) Except as otherwise set forth in Paragraph 2(f), prior to conveyance of the Northern Parcels, none of the Primary Parties shall meet or substantively communicate with the New Jersey Department of Environmental Protection ("DEP") or EPA or another governmental, quasi-governmental or regulatory agency regarding the NFE without first advising each other. Except as otherwise set forth in Paragraph 2(f), prior to conveyance of the Northern Parcels, all meetings and conference calls with governmental agencies regarding the NFE shall be scheduled to include all of the Primary Parties, to the extent permitted by the applicable regulatory agencies. Advance notice of any meeting shall be provided even if the agency does not agree to schedule such meeting so that the Primary Parties can attend. Except as otherwise set forth in Paragraph 2(f), the Primary Parties agree to provide each other with copies of any documents regarding the NFE submitted to the DEP, EPA or other governmental, quasi-governmental or regulatory agency prior to conveyance of the Northern Parcels.

(f) Notwithstanding the provisions of Paragraph 2(e), (i) the Acquiring Parties and NFE, LLC are not required to provide Chevron with advance notice or an opportunity to participate in the Acquiring Parties' and NFE, LLC's negotiations with EPA or DEP concerning the Order (defined in Paragraph 3(f)(i), below); (ii) Chevron is not required to provide the Acquiring Parties or NFE, LLC with advance notice or an opportunity to participate in Chevron's negotiations with EPA or DEP concerning the HSWA Permit Modification (defined in Paragraph 3(f)(ii), below); (iii) the Primary Parties each has the right to speak with EPA or DEP, with the other Primary Parties' participation, to assess the status of the other Primary

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Party(ies)'s discussions concerning the Order or the HSWA Permit Modification, as applicable, but not to negotiate; (iv) the Acquiring Parties and NFE, LLC will submit their proposed findings of fact and work plan for the Order no later than thirty days after entry of this Consent Order by the Court; and (v) as applicable, the Primary Parties will provide to each of the other Primary Parties copies of the Order and the HSWA Permit Modification both when the terms of such documents have been finalized and also when such documents have been fully executed or obtained, as the case may be.

(g) Both before and after conveyance of title to the Northern Parcels, all Parties shall have the right to request any documentation submitted to the DEP, EPA, or other governmental, quasi-governmental, or regulatory agency regarding the NFE. The costs incurred for the production by Chevron, NFE, LLC, the Acquiring Parties or any other Party of any requested documents shall be borne by the requesting Party.

3. **Conditions Preceding Conveyance and Closing.** The conveyance under the Contract of Sale described in Paragraph 2, above, shall be subject to satisfaction of the following conditions precedent:

(a) Chevron shall obtain a Modification of the HSWA Permit (the "HSWA Permit Modification") as described more fully in Paragraph 3(f)(ii) below;

(b) The Acquiring Parties and NFE, LLC shall execute a binding Administrative Order on Consent with the EPA (the "Order") as described more fully in Paragraph 3(f)(i) below; and

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(c) The New Jersey Industrial Site Recovery Act, N.J.S.A. 13:1K-6 *et seq.* ("ISRA") shall not be triggered by the conveyance of the Northern Parcels to NFE, LLC. The Parties acknowledge and agree that the DEP issued a letter of non-applicability ("LNA") on or about February 27, 2003 with respect to the NFE. The Parties further covenant and agree that no Party will seek any further determination from DEP regarding the applicability of ISRA to this transaction or the NFE.

(d) At Closing, Legacy Vulcan shall deliver to Chevron a guarantee agreement executed by Legacy Vulcan's parent (Vulcan Materials Company) in substantially the same form as attached hereto as Exhibit I.

(e) The conditions preceding conveyance set forth in Paragraphs 3(a), 3(b) and 3(c), above (collectively, the "Conditions Preceding Conveyance") shall not survive Closing of the conveyance of the Northern Parcels from Chevron to NFE, LLC.

(f) The Parties agree to work cooperatively, diligently, and in good faith to satisfy the Conditions Preceding Conveyance set forth in Paragraphs 3(a) and 3(b), and then to cause the Closing to occur in accordance with the following schedule:

(i) The Acquiring Parties and NFE, LLC will satisfy the Condition Preceding Conveyance relating to the Order, which Order requires the Acquiring Parties and NFE, LLC to investigate and/or remediate pursuant to RCRA the Solid Waste Management Units 46-50 ("SWMUs") and the Areas of Concern 11-12 ("AOCs") on the Northern Parcels (which Order shall be effective as of but not before the Closing), by executing said Order within fourteen (14) months after entry of this Consent Order by the Court, or within such longer period as the Primary Parties mutually agree upon in writing.

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(ii) Chevron will satisfy the Condition Preceding Conveyance relating to the HSWA Permit Modification, under which HSWA Permit Modification the EPA will remove the Northern Parcels including the SWMUs and the AOCs from the HSWA Permit (which HSWA Permit Modification shall be effective as of but not before the Closing), by obtaining said HSWA Permit Modification within eighteen (18) months after entry of this Consent Order by the Court, or within such longer period as the Primary Parties mutually agree upon in writing.

(iii) The Closing on the conveyance of the Northern Parcels to NFE, LLC will occur within fifteen (15) days after the later of (i) the date the Order has been signed by all applicable parties and becomes a final order or (ii) the date EPA issues its final decision approving the HSWA Permit Modification; or at such date for Closing as the Primary Parties mutually agree upon in writing.

(iv) Subject to Paragraphs 3(f)(iv)(A) and (B) below, if either or both of these two Conditions Preceding Conveyance (relating to the Order and the HSWA Permit Modification) have not been executed or obtained, as applicable, within the time frames set forth in Paragraphs 3(f)(i) and 3(f)(ii), respectively, or if the Closing on the conveyance of the Northern Parcels to NFE, LLC has not occurred within the time frame set forth in Paragraph 3(f)(iii), above, then the Parties agree to negotiate and/or mediate (with the Court-appointed mediator specified in Paragraph 7) cooperatively and in good faith an alternative settlement for a period of forty-five (45) days after such date, or for such longer period as the Primary Parties mutually agree upon in writing (the "Conferral Period"), as follows:

(A) In the event that the Acquiring Parties and NFE, LLC:

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(1) do not execute the Order with the EPA within fourteen (14) months after entry of this Consent Order by the Court, or within such longer period as the Primary Parties mutually agree upon in writing; or

(2) are unwilling or unable to proceed with the Closing within fifteen (15) days after the later of (i) the date the Order has been signed by all applicable parties and becomes a final order and (ii) the date EPA issues its final decision approving the HSWA Permit Modification, or such date for Closing as the Primary Parties mutually agree upon in writing,

Chevron may cause the Conferral Period to commence.

(B) In the event that Chevron:

(1) does not obtain the HSWA Permit Modification within eighteen (18) months after entry of this Consent Order by the Court, or within such longer period as the Primary Parties mutually agree upon in writing; or

(2) is unwilling or unable to proceed with the Closing within fifteen (15) days after the later of (i) the date the Order has been signed by all applicable parties and becomes a final order and (ii) the date EPA issues its final decision approving the HSWA Permit Modification, or such date for Closing as the Primary Parties mutually agree upon in writing,

the Acquiring Parties and NFE, LLC may cause the Conferral Period to commence.

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(v) If the Primary Parties cannot agree to an alternative settlement during the Conferral Period, then upon application of the Acquiring Parties, NFE, LLC or Chevron and a showing that the intended purpose of this Consent Order cannot otherwise be accomplished, the Court shall either (A) reopen the litigation or (B) grant such other relief as the Court deems appropriate.

**4. Remediation.** Upon conveyance of the Northern Parcels to NFE, LLC, the Primary Parties will proceed as follows:

(a) The Acquiring Parties and NFE, LLC shall perform any required investigation or remediation of any and all contaminants in the Northern Parcels in accordance with the requirements of applicable law. The Acquiring Parties and NFE, LLC acknowledge and agree that their obligations under this subparagraph shall be without regard to the source of the contamination and without the right to arbitrate whether any other Party is or should be liable for such contamination.

(b) The Acquiring Parties and NFE, LLC shall perform any required investigation or remediation of chlorinated solvents in the groundwater at both the Northern Parcels and the Southern Parcel in accordance with the requirements of applicable law. The Acquiring Parties and NFE, LLC acknowledge and agree that their obligations under this subparagraph shall be without regard to the source of the chlorinated solvents and without the right to arbitrate whether any other Party is or should be liable for the chlorinated solvents. Until the Acquiring Parties and NFE, LLC obtain a "no further action" letter, Response Action Outcome as defined in N.J.S.A. 58:10C-2, or similar governmental approval relating to chlorinated solvents in the groundwater at the Southern Parcel, Chevron agrees to provide the

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Acquiring Parties and NFE, LLC with copies of any request from DEP, EPA, or any other governmental agency, to conduct sampling for chlorinated solvents in groundwater at the Southern Parcel promptly upon receipt, and to notify the Acquiring Parties and NFE, LLC in writing in advance of any sampling it performs, or which another entity performs with Chevron's knowledge, of groundwater at the Southern Parcel which analyzes for chlorinated solvents. The Parties agree that the remediation may satisfy the least stringent standard required by a government agency. To achieve this standard, the Parties may establish engineering or institutional controls, including a deed notice and/or classification exception area (as defined in N.J.A.C. 7:9-6.4), that are acceptable to the governmental agency and the relevant Parties agree to execute such documents reasonably required by the governmental agency to establish such engineering and/or institutional controls.

(c) Chevron shall perform any required investigation or remediation of any and all contaminants in the groundwater at the Southern Parcel in accordance with the requirements of applicable law, except for chlorinated solvents in the groundwater which shall be the responsibility of the Acquiring Parties and NFE, LLC pursuant to subparagraph 4(b) above. Notwithstanding the preceding sentence, in the event DEP or EPA requires investigation or remediation of contaminants in the groundwater at the Southern Parcel as part of any required investigation or remediation of contamination of the Northern Parcels, the Acquiring Parties and NFE, LLC shall perform such work.

(d) The Primary Parties' agreements regarding the DITSWED-08 Area are set forth in Schedule "1," attached hereto and incorporated herein by reference.

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(e) Chevron shall perform any required investigation or remediation of any and all contamination of soils or sediments in the Southern Parcel in accordance with the requirements of applicable law. Chevron acknowledges and agrees that its obligations under this subparagraph shall be without regard to the source of the contamination and without the right to arbitrate whether any other Party is or should be liable for such contamination.

(f) Chevron shall be solely responsible for the selection and payment of consultants, engineers, attorneys and any other professionals necessary to fulfill its performance obligations, and for all costs associated with the performance of its obligations, under this Consent Order.

(g) The Acquiring Parties and NFE, LLC shall be solely responsible for the selection and payment of consultants, engineers, attorneys and any other professionals necessary to fulfill their performance obligations, and for all costs associated with the performance of their obligations, under this Consent Order.

(h) With respect to any investigation or remediation conducted at the NFE pursuant to this Consent Order, all Parties participating in the investigation and remediation agree to work cooperatively in order to achieve a result that is efficient and cost effective.

(i) Notwithstanding anything to the contrary in this Paragraph 4, Stolthaven's obligations are as set forth in Paragraph 8 of this Consent Order.

5. **Reciprocal Access Agreement.** Chevron shall provide to the Acquiring Parties and NFE, LLC access over the Southern Parcel as necessary to facilitate performance by the Acquiring Parties and NFE, LLC of their investigation and remediation obligations under this

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Consent Order, pursuant to the terms of the Access Agreement for Investigation and/or Remediation Work (the "Access Agreement") which shall be executed in the form attached hereto as Exhibit "B" of this Consent Order. The Acquiring Parties and NFE, LLC shall provide to Chevron access over the Northern Parcels as necessary to facilitate performance by Chevron of its investigation and remediation obligations under this Consent Order, pursuant to the terms of the Access Agreement, which shall be executed in the form attached as Exhibit "B" of this Consent Order.

**6. Limited Defense and Indemnity.**

(a) In the event that (i) one of the Acquiring Parties or NFE, LLC initiates litigation against a third party or reinstates Civil Action No. 97-1572 (DMC) seeking a response action (including investigation or remediation) for contamination including chlorinated solvents on or at, but not emanating from, the NFE; and/or a declaration of responsibility for contamination including chlorinated solvents on or at, but not emanating from, the NFE; and/or recovery of response costs including costs for investigation and/or remediation of contamination including chlorinated solvents on or at, but not emanating from, the NFE, and the third party files litigation against Chevron relating thereto (a "Third Party Claim") or (ii) Chevron initiates litigation against a third party or reinstates Civil Action No. 97-1572 (DMC) seeking a response action (including investigation or remediation) for contamination on or at, but not emanating from, the NFE; and/or a declaration of responsibility for contamination on or at, but not emanating from, the NFE; and/or recovery of response costs including costs for investigation and/or remediation of contamination on or at, but not emanating from, the NFE, and the third party files litigation against any or all of the Acquiring Parties or NFE, LLC relating thereto (also a "Third Party Claim"), then the party initiating or reinstating such litigation against the third

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party shall defend and indemnify the party subject to the Third Party Claim provided that the contamination at issue in the newly instituted or reinstituted litigation is the responsibility under this Consent Order of the party initiating or reinstating such litigation. NFE, LLC covenants and agrees it will not initiate any action described in part (i) of this Paragraph unless one or more of the Acquiring Parties also jointly initiates such action in which case NFE, LLC and that (those) Acquiring Party(ies) also initiating such action shall be jointly and severally responsible to defend and indemnify Chevron as set forth in this Paragraph 6(a).

(b) This indemnity and defense shall not cover any action or litigation to the extent it concerns contamination that exists beyond the surveyed property lines of the NFE as delineated in the map attached hereto as Exhibit "C."

(c) Notwithstanding any of the other provisions of this Limited Indemnity, in the event any of the Acquiring Parties or NFE, LLC initiates litigation against Shell regarding chlorinated solvents in the groundwater on or at the NFE, and in the event Shell joins Chevron and claims that the Acquiring Party(ies), NFE, LLC and/or Chevron is responsible not only for investigating and/or remediating chlorinated solvents on or at the NFE, but also for investigating and/or remediating chlorinated solvents that have migrated onto Shell's property from the NFE (such claim regarding chlorinated solvents that have migrated onto Shell's property hereinafter referred to as the "Shell Claim"), then the Acquiring Party(ies) or NFE, LLC who initiated the litigation against Shell shall defend but not indemnify Chevron in that litigation regarding the Shell Claim. In the event a court determines that the source of chlorinated solvents in the groundwater on Shell's property is on or at the NFE, the Acquiring Parties and NFE, LLC acknowledge their responsibility for any required investigation and/or remediation of the chlorinated solvents in the groundwater in both the Northern Parcels and Southern Parcel,

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without regard to the source of the chlorinated solvents and without the right to arbitrate whether any other Party is or should be liable for such chlorinated solvents. Nothing in this Paragraph 6(c) changes any of the obligations under Paragraph 6(a) of this Consent Order. NFE, LLC covenants and agrees it will not initiate any action against Shell as described in this Paragraph unless one or more of the Acquiring Parties also jointly initiates such action in which case NFE, LLC and that (those) Acquiring Party(ies) also initiating such action shall be jointly and severally responsible to defend but not indemnify Chevron as set forth in this Paragraph 6(c).

(d) A Party providing defense of a Third Party Claim under Paragraph 6(a) or a Shell Claim under Paragraph 6(c) shall have the option, at its sole cost and expense, to retain counsel for the Party(ies) it defends, provided that such counsel shall be approved by the defended Party(ies), whose approval shall not unreasonably be withheld, conditioned or delayed. The Party(ies) defended under this Paragraph 6 will reasonably cooperate with and assist in defending against any such Third Party Claim or Shell Claim. The Party(ies) indemnified or defended under this Paragraph 6 shall give written notice to the indemnifying or defending Party promptly upon receipt of any Third Party Claim or Shell Claim for which it/they claim protection hereunder.

7. **Mediation.** In the event there is any dispute that arises over the interpretation or implementation of the terms of this Consent Order, the Parties shall have the right to apply to the Court appointed mediator, Judge R. Benjamin Cohen. If Judge Cohen terminates his appointment or is otherwise unable or unwilling to serve as the mediator in this matter, the Parties shall have the right to apply to the Court for appointment of another mediator. All fees and expenses of the mediator and other like costs incurred in common in conducting any such mediation shall be shared equally among the Parties involved in the mediation with Chevron.

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Legacy Vulcan and C.P./PAHC each paying a one-third (1/3) share. If any other Party(ies) also participate in the mediation, then that (those) Party(ies), Chevron, Legacy Vulcan and C.P./PAHC shall each pay equal shares of the mediation fees, expenses, and costs.

**8. Stolthaven Pipeline.** Stolthaven shall have the following obligations:

(a) Stolthaven shall comply with the requirements of the Administrative Consent Order entered on or about May 14, 1999 between Stolthaven and the DEP ("1999 ACO") (attached hereto as Exhibit "D"). Stolthaven will maintain responsibility for (i) all on-going clean-up activities involving its 1998 pipeline discharge and (ii) any future remediation costs that may become necessary with respect to any past discharge from its pipeline (defined as any discharge occurring prior to the assumption of liability by a successor of Stolthaven pursuant to an assignment of the Easement Agreement between Stolthaven and Chevron attached as Exhibit "H" to this Consent Order).

(b) Stolthaven will obtain a "no further action" letter ("NFA"), Response Action Outcome as defined in N.J.S.A. 58:10C-2 ("RAO"), or similar governmental approval from DEP with respect to the 1998 pipeline discharge as required by the 1999 ACO. The area being remediated under the 1999 ACO is shown on Exhibit "E" hereto. Stolthaven shall perform the remediation to satisfy the least stringent remediation standard required by DEP. To achieve this standard, Stolthaven may establish engineering or institutional controls, including a Deed Notice and/or Classification Exception Area ("CEA"), that are acceptable to DEP. Chevron will execute those documents required by DEP to establish the institutional and/or engineering controls.

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(c) With respect to any other discharges from its pipeline, Stolthaven will obtain an NFA, RAO, or similar governmental approval from DEP using the same remediation standard set forth in Paragraph 8(b).

(d) Stolthaven shall supply Chevron and the Acquiring Parties with a copy of all documents submitted to or received from the DEP or any governmental, quasi-governmental or other regulatory agency in connection with its responsibilities under this Paragraph 8. Chevron shall have the right to review all investigative and remedial activities prior to implementation.

**9. Mutual Releases.**

(a) Releases.

(i) Except for any claims arising out of obligations under this Consent Order, and subject to Paragraphs 9(a)(vii) through (ix) and 9(b), (d) and (e), effective at the time of Closing, Chevron releases, remises, and forever discharges and waives any and all claims, whether known or unknown, which Chevron ever had, now has or may have in the future against American Cyanamid, Bayer, C.P., PAHC and Legacy Vulcan (the "Defendants") and NFE, LLC which relate to actions, occurrences or conditions at the NFE prior to Closing, including, but not limited to, all claims which were or could have been asserted by Chevron in the Complaint and the Amended Complaint filed in the Litigation.

(ii) Except for any claims arising out of obligations under this Consent Order, and subject to Paragraphs 9(a)(vii) through (ix) and 9(b), (d) and (e), effective at the time of Closing, the Defendants and NFE, LLC release, remise, and forever discharge and waive any

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and all claims, whether known or unknown, which Defendants or NFE, LLC ever had, now have or may have in the future against Chevron which relate to actions, occurrences or conditions at the NFE prior to Closing, including, but not limited to, all claims which were or could have been asserted by the Defendants in the Litigation.

(iii) Except for any claims arising out of obligations under this Consent Order, and subject to Paragraphs 9(a)(vii) through (ix) and 9(b), (d) and (e), effective at the time of Closing, the Third Party Plaintiffs and NFE, LLC release, remise, and forever discharge and waive any and all claims, whether known or unknown, which Third Party Plaintiffs and NFE, LLC ever had, now have or may have in the future against Stolthaven which relate to actions, occurrences or conditions at the NFE prior to Closing, including, but not limited to, all claims which were or could have been asserted by the Third Party Plaintiffs in the Third Party Complaint, as amended, filed in the Litigation.

(iv) Except for any claims arising out of obligations under this Consent Order, contingent upon payment as set forth in more detail in a separate agreement between Bayer, the Acquiring Parties and NFE, LLC, and subject to Paragraphs 9(a)(vii) through (ix) and 9(b), (d) and (e), effective at the time of Closing, the Third-Party Plaintiffs and NFE, LLC release, remise, and forever discharge and waive any and all claims, whether known or unknown, which Third-Party Plaintiffs and NFE, LLC ever had, now have or may have in the future against Bayer which relate to actions, occurrences or conditions at the NFE prior to Closing, including, but not limited to, all claims which were or could have been asserted by the Third-Party Plaintiffs and NFE, LLC in the Third Party Complaint in the Litigation.

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(v) Except for any claims arising out of obligations under this Consent Order, and subject to Paragraphs 9(a)(vii) through (ix) and 9(b), (d) and (e), effective at the time of Closing, the Third Party Plaintiffs, NFE, LLC, Bayer and Stolthaven release, remise and forever discharge and waive any and all claims, whether known or unknown, the Third Party Plaintiffs, NFE, LLC, Bayer and Stolthaven ever had, now have or may have in the future which relate to actions, occurrences or conditions at the NFE prior to Closing, including but not limited to all claims, cross-claims and counterclaims which were or could have been asserted by and among the Third Party Plaintiffs, NFE, LLC, Bayer, and Stolthaven, or against Chevron.

(vi) The benefit of the Mutual Releases set forth in Paragraphs 9(a)(i) through 9(a)(v) hereof shall extend to Imperial Chemical Industries PLC, Zeneca Group PLC, Zeneca Holdings Inc., Zeneca Inc., ICI American Holdings Inc., ICI Americas Inc., and Stauffer Management Company.

(vii) The Mutual Releases set forth in Paragraphs 9(a)(i) through 9(a)(vi) hereof are not intended to be, and shall not constitute or be construed as, a general release.

(viii) The Mutual Releases set forth in Paragraphs 9(a)(i) through 9(a)(vi) hereof are not intended to, and shall not, extend or otherwise release or discharge any rights, privileges, benefits, duties, or obligations of any of the Parties hereto set forth in, or otherwise arising under, this Consent Order.

(ix) The Mutual Releases set forth in Paragraphs 9(a)(i) through 9(a)(vi) hereof are not intended to, and shall not, extend or otherwise release or discharge any rights, privileges, benefits, duties, or obligations of any of the Parties hereto with respect to

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claims for Natural Resource Damages, as defined below, except to the extent that the damage claim was, is or will be satisfied by any remediation at the NFE performed pursuant to this Consent Order. Natural Resource Damages shall include all claims arising from a discharge of hazardous substances, both known and unknown, recoverable as natural resource damages under applicable law, including without limitation the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. 9601 et seq., the Oil Pollution Act, 33 U.S.C. 2701 et seq., the Clean Water Act, 33 U.S.C. 1251 et seq., the Spill Compensation and Control Act, N.J.S.A. 58:10-23.11 et seq., and any other applicable state, federal or common law, statute or regulation, including (A) compensation for the lost value of, injury to, or destruction of the State's resources and services flowing from these resources, including but not limited to the costs of assessments, attorney's fees, consultant's or expert fees, interest, or any other expense or costs, and (B) the restoration, rehabilitation or acquisition of the equivalent of the injured resources and the services flowing from these resources. The Parties acknowledge that in November 2005, Chevron, DEP, and the New Jersey Spill Compensation Fund executed a Natural Resources Damages Settlement Agreement (the "NRD Settlement"). The Parties have copies of the NRD Settlement. Nothing in this Paragraph 9(a)(ix) shall change or affect the protections and benefits Chevron has by virtue of the NRD Settlement.

(b) The releases in Paragraph 9(a) take effect as of the Closing (the transfer of title to the Northern Parcels) which occurs pursuant to the Contract of Sale between Chevron and NFE, LLC.

(c) Alumet.

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(i) The Parties acknowledge and agree that the releases of Alumet set forth in the 2002 Agreement became effective as of August 7, 2002 (the "Alumet Release Date"), pursuant to the terms of the 2002 Agreement, and that those releases have at all times been, and continue to be, in effect since the Alumet Release Date.

(ii) The Parties acknowledge and agree that Alumet Corporation was dismissed with prejudice from the Litigation by Order filed on August 7, 2002 (attached hereto as Exhibit "F".)

(d) No admission of liability.

The Parties agree that this Consent Order is the result of a compromise and accord, and shall not constitute or be construed as an admission of any liability or wrongdoing on the part of any of them.

(e) Miscellaneous Provisions Regarding Mutual Releases.

(i) Severability. If any provision of these Mutual Releases, or the application thereof, shall for any reason or to any extent be construed by a Court of competent jurisdiction to be invalid or unenforceable, the remainder of these Mutual Releases, and application of such provisions to other circumstances, shall be interpreted so as to reasonably effect the intent of the Parties hereto.

(ii) Binding Effect, Assignment, and No Third Party Beneficiaries.

These Mutual Releases shall be binding upon and shall inure to the benefit of the Parties hereto, and their respective successors, permitted assigns, affiliates, parents, subsidiaries and

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predecessors. Other than as set forth in the preceding sentence, and except as expressly set forth in Paragraph 9(a)(vi) above, there are no third party beneficiaries to this Paragraph 9.

**10. Settlement Payments.**

(a) The Parties acknowledge and agree that, pursuant to the terms of the 2002 Settlement, the Acquiring Parties paid to Chevron, and Chevron received, the sum of \$900,000.00 (Nine Hundred Thousand Dollars). This payment was and remains non-refundable, and was full satisfaction for any and all of Chevron's claims for past costs (investigation, remediation or response costs and attorneys' fees and costs) incurred through the entry of the 2002 Settlement in connection with, in relation to or otherwise attributed or assigned to the NFE by Chevron.

(b) The Parties acknowledge and agree that, pursuant to the terms of the 2002 Settlement, Alumet paid the Acquiring Parties a sum of \$75,000.00 (Seventy-five Thousand Dollars) in full satisfaction of Alumet's obligations under the 2002 Settlement.

(c) Each of the Parties hereto may allocate the settlement payments/receipts according to its respective discretion, as long as that allocation does not detrimentally impact upon any other Party.

**11. Other Litigation.** Nothing in this Consent Order shall restrict any Party from pursuing any nonparty for liability for contamination on or at the NFE. The Parties agree that Imperial Chemical Industries PLC, Zeneca Group PLC, Zeneca Holdings Inc., Zeneca Inc., ICI American Holdings Inc., ICI Americas Inc., Stauffer Management Company, Alumet and Howmet Corporation shall not be considered a nonparty, but Shell shall be considered a nonparty, for purposes of this Paragraph 11. The Court and the Parties acknowledge that the

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Entire Controversy Doctrine will not restrict any Party from pursuing any nonparty for such liability.

12. **Jurisdiction.** The Parties shall present this Consent Order to the Court for entry and approval, and for its continued oversight consistent with this Paragraph 12. The Court shall retain jurisdiction of this matter for the purpose of enabling the Parties to this Consent Order to apply to the Court for any further relief that may be necessary to construe, carry out or achieve the terms of this Consent Order, or remedying any breach of the Consent Order, including legal or equitable relief.

13. **Modification.** The terms of this Consent Order shall not be changed, revised or modified except by a written agreement signed by all of the Parties hereto that are or may be impacted by such change, revision, or modification.

14. **Reservation of Rights.** The Parties do not by this Agreement settle any claims, do not release and do hereby reserve any rights they may have, with respect to contamination that may exist beyond the surveyed property lines of the NFE as set forth in Exhibit C, including, without limitation, any and all claims at law or in equity against any other party with respect to such contamination.

15. **Counterparts.** This Consent Order may be signed in counterparts, all of which shall be considered an original and together shall constitute one and the same instrument.

16. **Parties Bound.** Upon execution by all of the Parties and entry by the Court, this Consent Order shall be binding upon and inure to the benefit of the Parties hereto and their respective successors and assigns.

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17. **Press Releases.** The Parties agree that no press release or other forms of public information shall issue in regard to this Consent Order, unless required by law or as may be needed to implement this Consent Order.

18. **Notice.** Any notice required under this Consent Order shall be given as follows:

If to Chevron:

Douglas F. Schleicher, Esq.  
Marc Stofman, Esq.  
Klehr, Harrison, Harvey, Branzburg & Ellers, LLP  
1835 Market Street  
Philadelphia, PA 19102  
Phone: (215) 569-2795  
Fax: (215) 568-6603

If to Legacy Vulcan:

Susanne Peticolas, Esq.  
David A. Brooks, Esq.  
Gibbons P.C.  
One Gateway Center  
Newark, NJ 07102-5310  
Phone: (973) 596-4751/4719  
Fax: (973) 639-6340/8342

If to C.P./PAHC/American Cyanamid:

George J. Tyler, Esq.  
Margaret B. Carmeli, Esq.  
Tyler & Carmeli, P.C.  
1AAA Drive, Suite 204  
Robbinsville, New Jersey 08691  
Phone: (609) 631-0600  
Fax: (609) 631-0651

If to Bayer:

Glen R. Stuart, Esq.  
Morgan, Lewis & Bockius LLP  
1701 Market Street  
Philadelphia, PA 19103  
Phone: (215) 963-5883  
Fax: (215) 963-5001

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If to Stolthaven:

Karen E. Murphy, Esq.  
Bressler, Amery & Ross, PC  
For overnight delivery:  
325 Columbia Turnpike  
Florham Park, New Jersey 07932  
For first class mail:  
P.O. BOX 1980  
Morristown, New Jersey 07962  
Telephone: (973) 514-1200  
Fax : (973) 514-1660

If to NFE, LLC:

Susanne Peticolas, Esq.  
Gibbons P.C.  
One Gateway Center  
Newark, NJ 07102-5310  
Phone: (973) 596-4751/4719  
Fax: (973) 639-6340/8342

and

George J. Tyler, Esq.  
Tyler & Carmeli, P.C.  
1AAA Drive, Suite 204  
Robbinsville, New Jersey 08691  
Phone: (609) 631-0600  
Fax: (609) 631-0651

19. **The Litigation**. Unless Closing does not occur, in which case the Parties will proceed as set forth in Paragraph 3(f)(iv) and (v), all claims, defenses, rights and obligations of the Parties shall be merged into and enforceable by and through this Consent Order, and the Litigation shall remain marked settled and closed on the Court docket. The claims asserted in the Litigation by and against Shell have been dismissed without prejudice. In any subsequent litigation, except for litigation to enforce the terms of this Consent Order, this Consent Order shall not be admissible as evidence of liability or allocation with respect to any Party, although the Parties agree that testing results and evidence that would otherwise be admissible shall not be

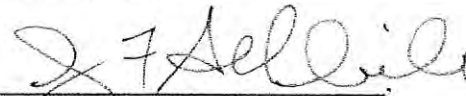
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excluded solely because such evidence was generated and/or produced in connection with the terms of this Consent Order or after the date of the 2002 Settlement.

**20. Authority.** The undersigned represent and warrant that they have full authority to enter into this Consent Order and all other documents executed in connection herewith on behalf of the Party(ies) for whom they represent.

Chevron U.S.A. Inc.

Dated: June 2, 2010

By:   
of Klehr, Harrison, Harvey,  
Branzburg & Ellers, LLP,  
its attorneys of record

Legacy Vulcan Corp.

Dated:

By: \_\_\_\_\_  
of Gibbons, P.C.,  
its attorneys of record

C.P. Chemicals, Inc.

Dated:

By: \_\_\_\_\_  
of Tyler & Carmeli, P.C.,  
its attorneys of record

Phibro Animal Health Corporation, formerly  
known as Philipp Brothers Chemicals, Inc.

Dated:

By: \_\_\_\_\_  
of Tyler & Carmeli, P.C.,  
its attorneys of record

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excluded solely because such evidence was generated and/or produced in connection with the terms of this Consent Order or after the date of the 2002 Settlement.

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Chevron U.S.A. Inc.

Dated:

By: \_\_\_\_\_  
of Klehr, Harrison, Harvey,  
Branzburg & Ellers, LLP,  
its attorneys of record

Legacy Vulcan Corp.

Dated: *May 28, 2010*

By: *Rosanne Petricola*  
of Gibbons, P.C.,  
its attorneys of record

C.P. Chemicals, Inc.

Dated:

By: \_\_\_\_\_  
of Tyler & Carmeli, P.C.,  
its attorneys of record

Phibro Animal Health Corporation, formerly  
known as Philipp Brothers Chemicals, Inc.

Dated:

By: \_\_\_\_\_  
of Tyler & Carmeli, P.C.,  
its attorneys of record

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excluded solely because such evidence was generated and/or produced in connection with the terms of this Consent Order or after the date of the 2002 Settlement.

20. **Authority.** The undersigned represent and warrant that they have full authority to enter into this Consent Order and all other documents executed in connection herewith on behalf of the Party(ies) for whom they represent.

Chevron U.S.A. Inc.

Dated:

By: \_\_\_\_\_,  
of Klehr, Harrison, Harvey,  
Branzburg & Ellers, LLP,  
its attorneys of record

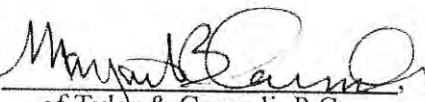
Legacy Vulcan Corp.

Dated:

By: \_\_\_\_\_,  
of Gibbons, P.C.,  
its attorneys of record

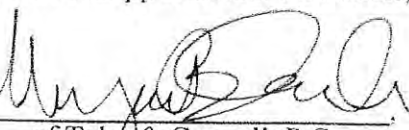
C.P. Chemicals, Inc.

Dated: June 2, 2010

By:   
of Tyler & Carmeli, P.C.,  
its attorneys of record


Phibro Animal Health Corporation, formerly  
known as Philipp Brothers Chemicals, Inc.

Dated: June 2, 2010

By:   
of Tyler & Carmeli, P.C.,  
its attorneys of record

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Cytec Industries as Successor-In-Interest to  
American Cyanamid Company.

By: ,  
of Tyler & Carmeli, P.C.,  
its attorneys of record

Dated: June 2, 2010

Bayer CropScience Inc., by Stauffer  
Management Company, LLC its litigation  
agent

Dated:

By: \_\_\_\_\_,  
of Morgan, Lewis & Bockius LLP,  
its attorneys of record

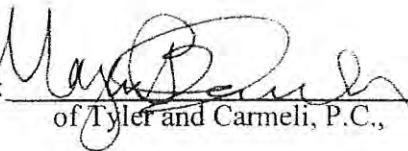
Stolthaven Perth Amboy, Inc.

Dated:

By: \_\_\_\_\_,  
of Bressler, Amery & Ross, PC,  
its attorneys of record

North Field Extension, LLC

Dated: June 2, 2010

By: ,  
of Tyler and Carmeli, P.C.,  
and

Dated:

By: \_\_\_\_\_,  
of Gibbons, P.C.,  
its attorneys of record

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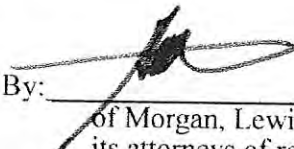
Cytec Industries as Successor-In-Interest to  
American Cyanamid Company.

Dated:

By: \_\_\_\_\_,  
of Tyler & Carmeli, P.C.,  
its attorneys of record

Bayer CropScience Inc., by Stauffer  
Management Company, LLC its litigation  
agent

Dated:

By:  \_\_\_\_\_,  
of Morgan, Lewis & Bockius LLP,  
its attorneys of record

Stolthaven Perth Amboy, Inc.

Dated:

By: \_\_\_\_\_,  
of Bressler, Amery & Ross, PC,  
its attorneys of record

North Field Extension, LLC

Dated:

By: \_\_\_\_\_,  
of Tyler and Carmeli, P.C.,  
and

Dated:

By: \_\_\_\_\_,  
of Gibbons, P.C.,  
its attorneys of record

**Execution Version**

Cytec Industries as Successor-In-Interest to  
American Cyanamid Company.

Dated:

By: \_\_\_\_\_,  
of Tyler & Carmeli, P.C.,  
its attorneys of record

Bayer CropScience Inc., by Stauffer  
Management Company, LLC its litigation  
agent

Dated:

By: \_\_\_\_\_,  
of Morgan, Lewis & Bockius LLP,  
its attorneys of record

Stolthaven Perth Amboy, Inc.

Dated: *May 5, 2010*

By: *Karen E. Murphy*  
of Bressler, Amery & Ross, PC,  
its attorneys of record

North Field Extension, LLC

Dated:

By: \_\_\_\_\_,  
of Tyler and Carmeli, P.C.,  
and

Dated:

By: \_\_\_\_\_,  
of Gibbons, P.C.,  
its attorneys of record

**Execution Version**

Cytec Industries as Successor-In-Interest to  
American Cyanamid Company.

By: \_\_\_\_\_,

Dated:

of Tyler & Carmeli, P.C.,  
its attorneys of record

Bayer CropScience Inc., by Stauffer  
Management Company, LLC its litigation  
agent

By: \_\_\_\_\_,

Dated:

of Morgan, Lewis & Bockius LLP,  
its attorneys of record

Stolthaven Perth Amboy, Inc.

By: \_\_\_\_\_,

Dated:

of Bressler, Amery & Ross, PC,  
its attorneys of record

North Field Extension, LLC

By: \_\_\_\_\_,

Dated:

of Tyler and Carmeli, P.C.,

and

Dated:

*May 28, 2010*

By:

*Susanne Petricekas*  
of Gibbons, P.C.,  
its attorneys of record

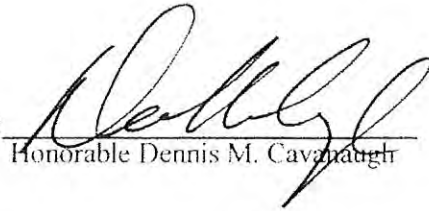
**Execution Version**

SO ORDERED:

Dated:

6/23/10

By:

  
Honorable Dennis M. Cavanaugh

## ATTACHMENT 5

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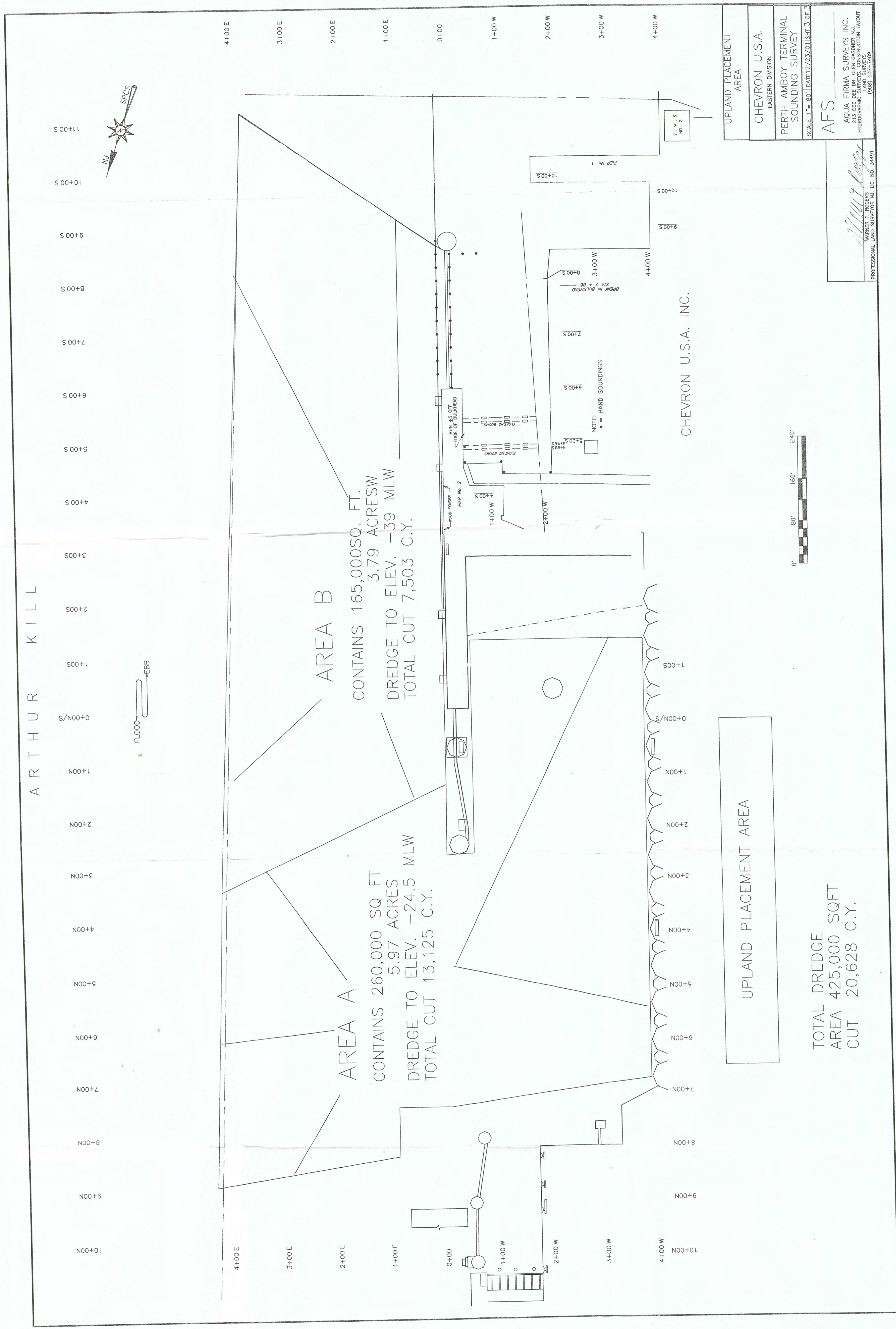
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## **ATTACHMENT 5**

### **Dredging Documents**

Figure 5-1 2003 Arthur Kill Dredging Areas  
October 10, 1997 Water Front Development Water Quality Certificate Permit  
December 23, 2001 Upland Placement Survey





Att 2



STATE OF NEW JERSEY  
DEPARTMENT OF ENVIRONMENTAL PROTECTION

(See Issuing Division below)



## PERMIT\*

The New Jersey Department of Environmental Protection grants this permit in accordance with your application, attachments accompanying same application, and applicable laws and regulations. This permit is also subject to the further conditions and stipulations enumerated in the supporting documents which are agreed to by the permittee upon acceptance of the permit.

Permit No. 1216-90-0001.12

Application No. Same as Permit No.

Issuance Date

Effective Date

Expiration Date

Name and Address of Applicant

Chevron Products Company  
1200 State Street  
Perth Amboy, NJ 08861

Name and Address of Owner

Same as applicant

Name and Address of Operator

Same as applicant

Location of Activity/Facility (Street Address)

Perth Amboy City  
Middlesex County

1

481/484

Issuing Division

Land Use Regulation  
Program

Statute(s)

NJSA 12:5-3

NJSA 58:10A-1

Lot

Block

Type of Permit

~~Waterfront Development~~  
Water Quality Certificate

Maximum Approved Capacity,  
if applicable

N/A

This permit grants permission to:

dredge by a closed clamshell bucket, an area, approximately 1100 feet long by approximately 150 feet wide. Approximately 20,000 cu yds of sediments would be removed initially to a depth of -39 feet below the plane of the mean low water, with two feet of allowable over dredge, and subsequent placement in an on-site designated State approved upland disposal site, known as the East Yard Basin. The stated purpose of this project is to reestablish adequate water depths at the facility for safe navigation of container vessels.

This permit is authorized under and in compliance with Coastal Zone Management Rules for Maintenance Dredging (N.J.A.C. 7:7E-4.2(2)) and Dredge Spoil disposal on Land (7:7E-7.12)

The plans hereby approved consist of two sheets (attached) as prepared by the applicant, dated June 17, 1997, unrevised, entitled:

"Chevron Products Company, Perth Amboy Refinery, Perth Amboy, NJ Maintenance Dredging and Upland Placement Project".

Prepared by:

*Paul Drake*  
Paul Drake

Page 1 of 3

Revised Date

Approved by the Department of Environmental Protection

Name (Print or Type)

Title

Signature

Date

\* The word permit means "approval, certification, registration, etc."

(General Conditions are on the Reverse Side)

Chevron Products Company  
File No. 1216-90-0001.12

Page 2

This permit is issued subject to and provided that the following conditions can be met to the satisfaction of the Land Use Regulation Program. All conditions must be met prior to construction unless otherwise specified. The issuance of this permit does not relinquish any Tidelands claims, if any. All Physical Conditions are subject to on-site compliance inspection. Please notify the Bureau of Enforcement, (401 East State Street, CN 422, Trenton, New Jersey 08625), in writing at least 3 days prior to commencement of construction or site preparation.

**Physical Conditions:**

1. No debris from any construction activity shall be allowed to enter the waterway. There shall be no barge overflow during dredging operations.
2. The dredged material shall be placed into a scow and transported alongside the berth nearest the disposal area (an unused tank pit). The dredged material shall then be removed from the scow by closed clamshell bucket and placed into trucks on the pier. The trucks would transport the dredged material to the upland disposal area.
3. All trucks used to transport dredged material from scows to the East Yard Basin shall have sealed cargo beds or be lined and have sufficient freeboard maintained in the trucks so as to prevent dredged material from leaking during transport.
4. All trucks used to transport dredged material to the East yard Basin shall not be driven through the basin. Dredged material shall be dumped from the edge of the basin.
5. Machinery shall not operate in the basin. Movement of the material within the basin shall be accomplished by dragline or a long arm excavator operating from the basin's edge.
6. Excess water shall be decanted by means of a surface pump or siphon. All decant water shall be processed through the on-site effluent treatment plant and discharged in accordance with the NJPDES permit for that plant.
7. Under no circumstances shall any dredged material or decant water be permitted to escape the East Yard Basin. Once the basin has reached its capacity to contain both the dredged material and free water, the dredging operation must cease. Any discharge of dredge material or water from the basin, other than as provided for by the above conditions, shall constitute a violation of this permit and water quality certificate.
8. Every precaution shall be taken during the transfer of material from the scows to trucks to prevent spilling of the material. All accidental spills shall be cleaned up immediately.
9. This permit is hereby authorized as a one-time permit for the dredging work specified since the volume of the dredge material disposal area in the East Yard Basin will be exhausted upon completion of the authorized work.
10. Any change in the disposal location of the sediments shall require notification to the Land Use Regulation Program and may require additional sediment sampling and testing.
11. Upon completion of the project, the permittee shall complete closure of the East yard Basin as per the approved closure plan and any subsequent amendments thereto.

Chevron Products Company  
File No. 1216-90-0001.12

Page 3 of 3

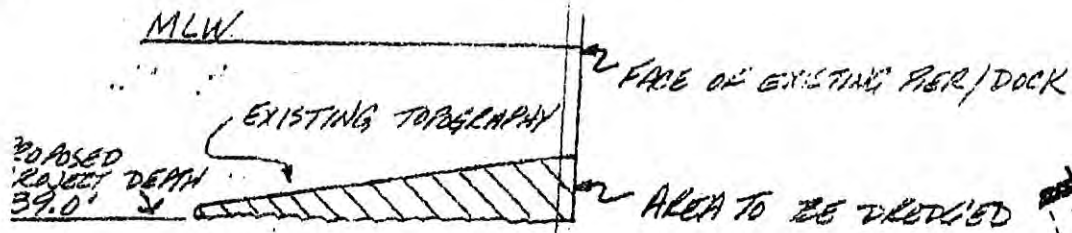
12. This permit is hereby conditioned upon full compliance with the information to be submitted by Chevron to the Bureau of State Case Management, NJDEP as detailed in their July 17, 1997 letter to Thomas Lambert of Chevron USA Products Company. Failure to comply with the requirements of the Bureau of State Case Management, NJDEP may be cause for revocation of this permit.

Approved by:

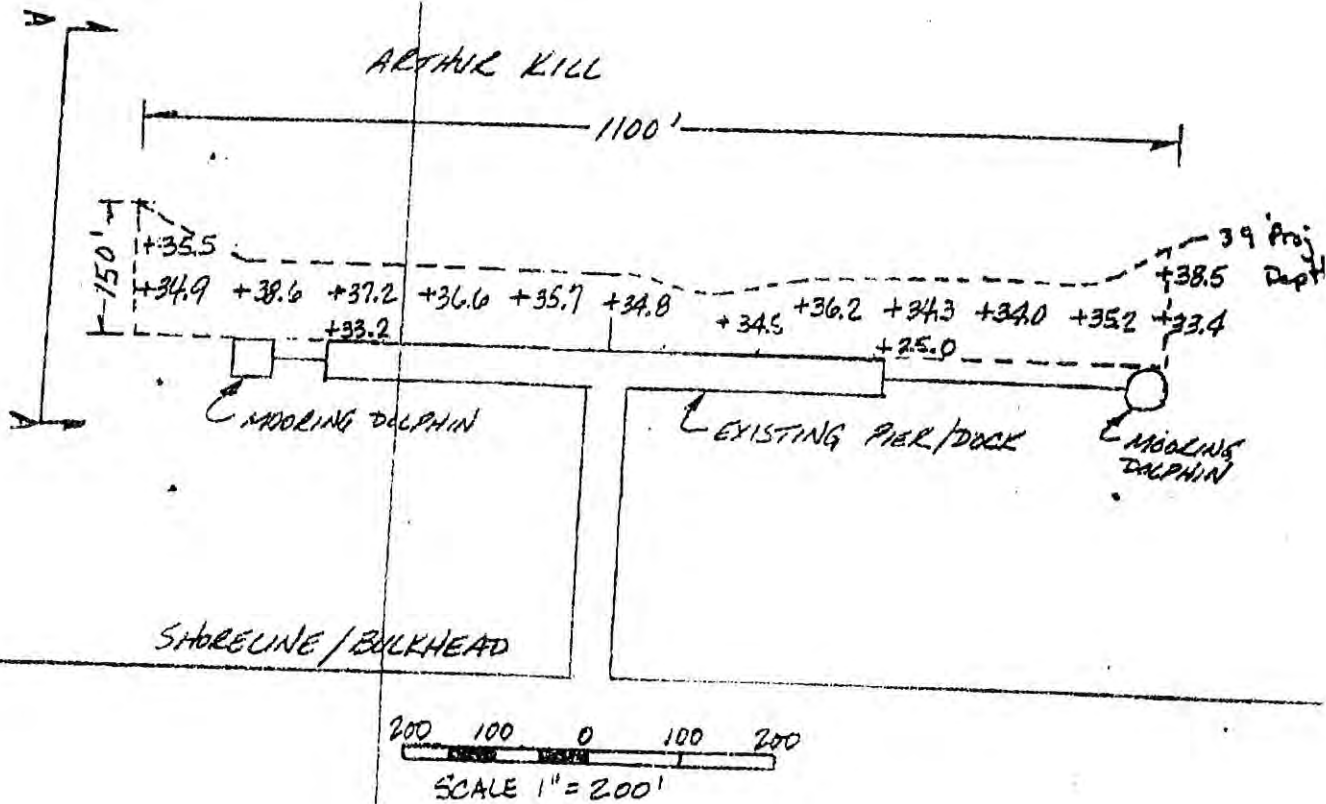
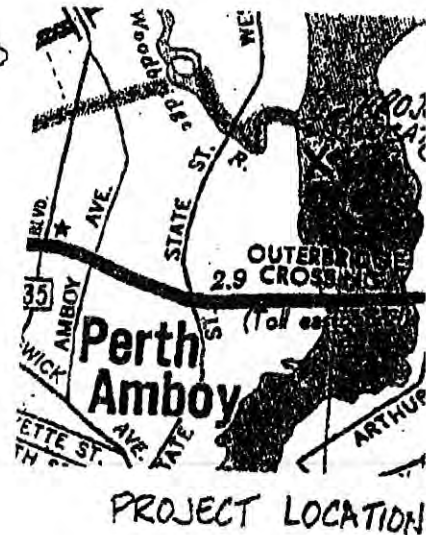
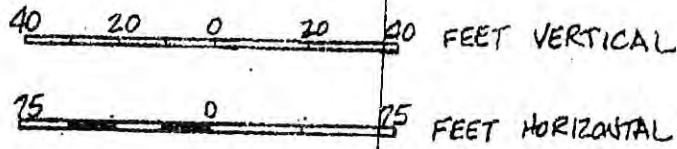


Robert B. Piel, Jr., Manager  
Bureau of Inland Regulation

10/9/97  
Date



### SECTION A-A

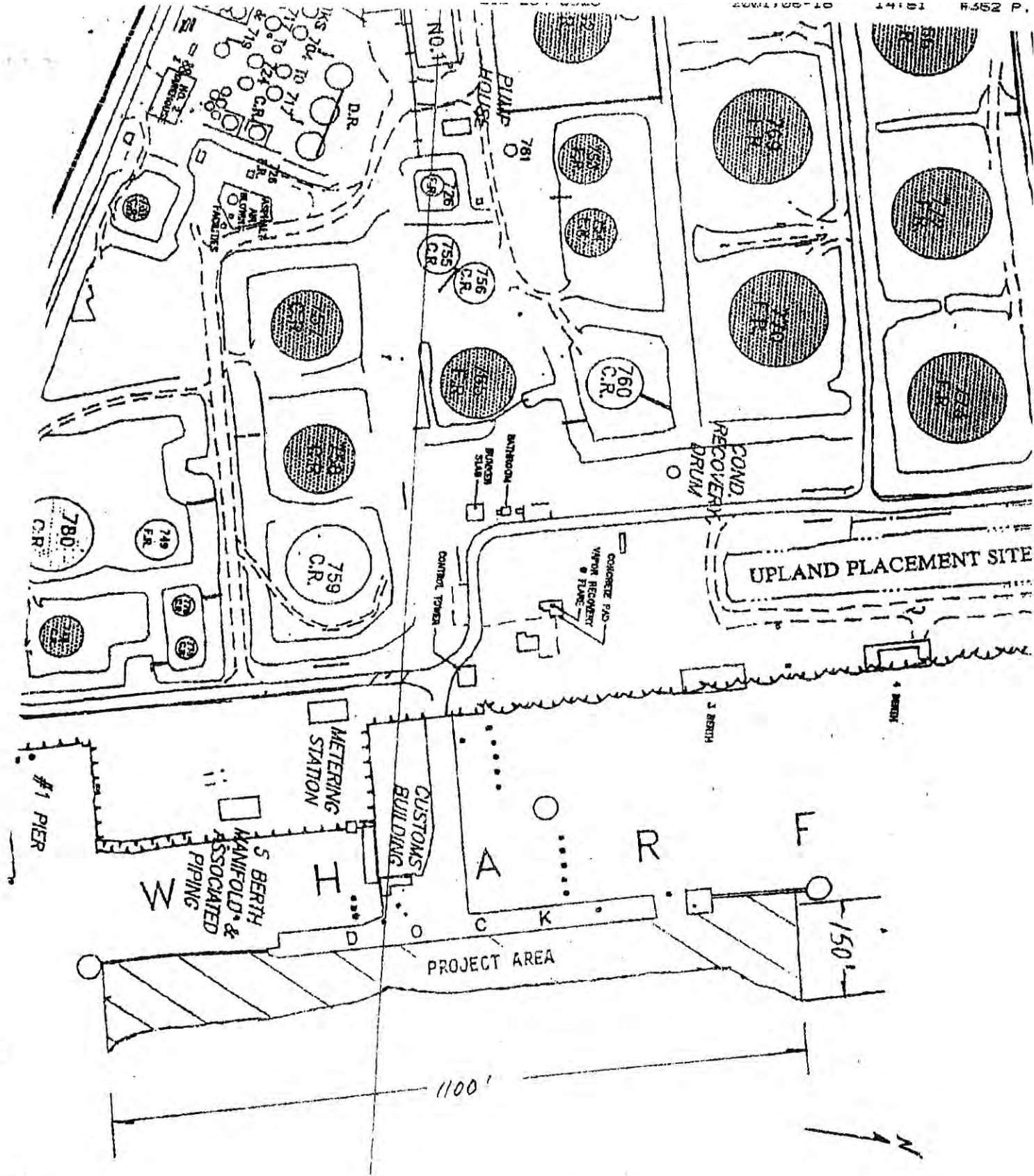


Chevron Products Company, Perth Amboy Refinery, Perth Amboy, NJ

Maintenance Dredging and Upland Placement Project

June 17, 1997

Sheet 1 of 2



Scale 1 inch = 200 feet